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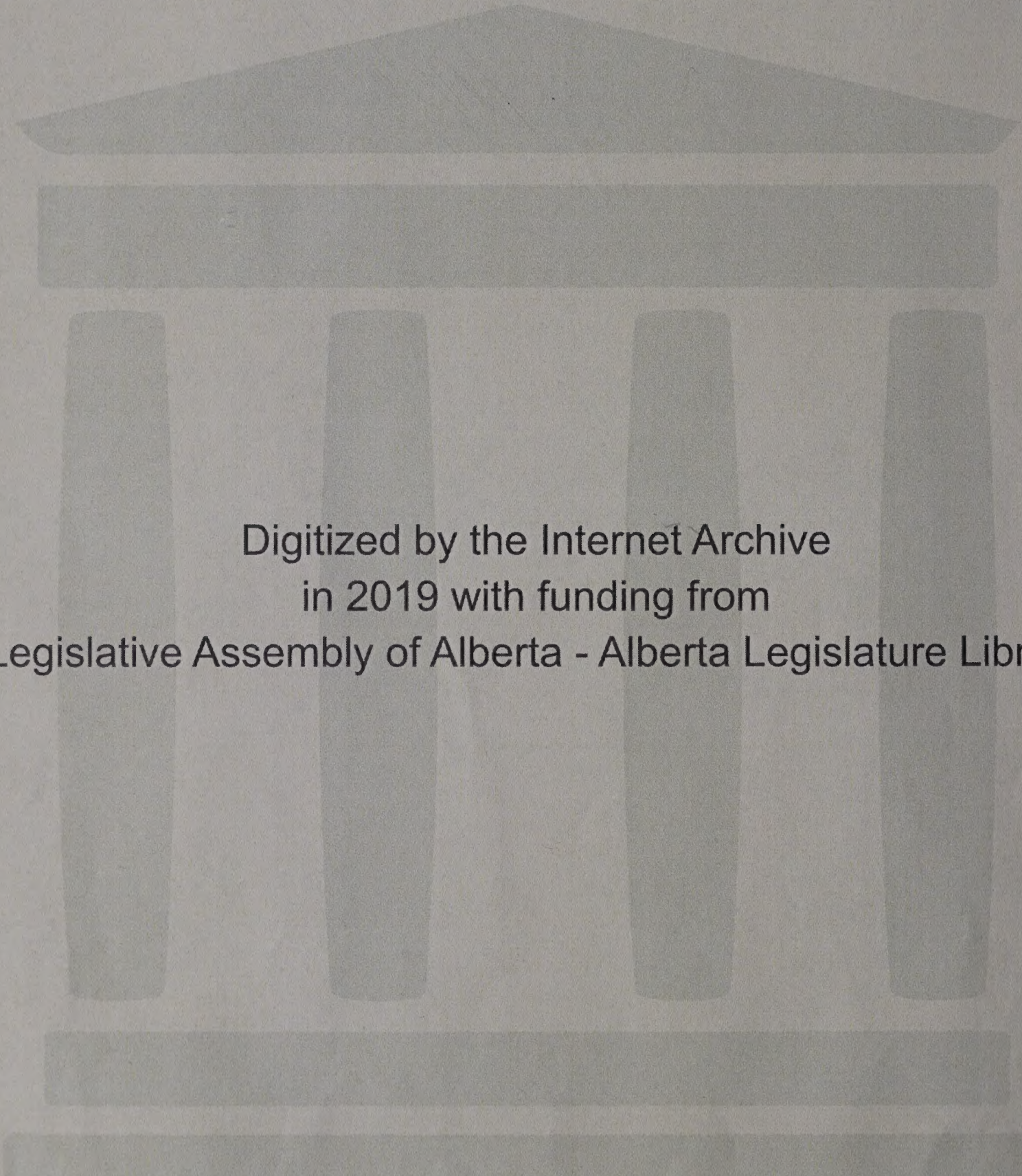
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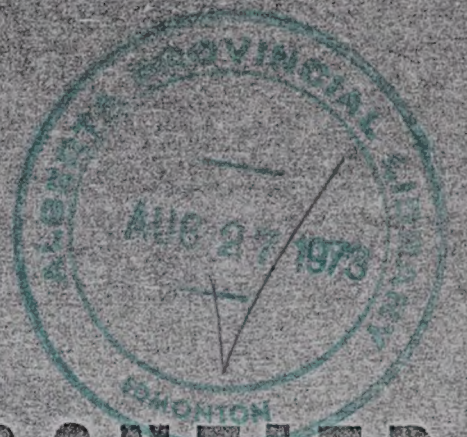
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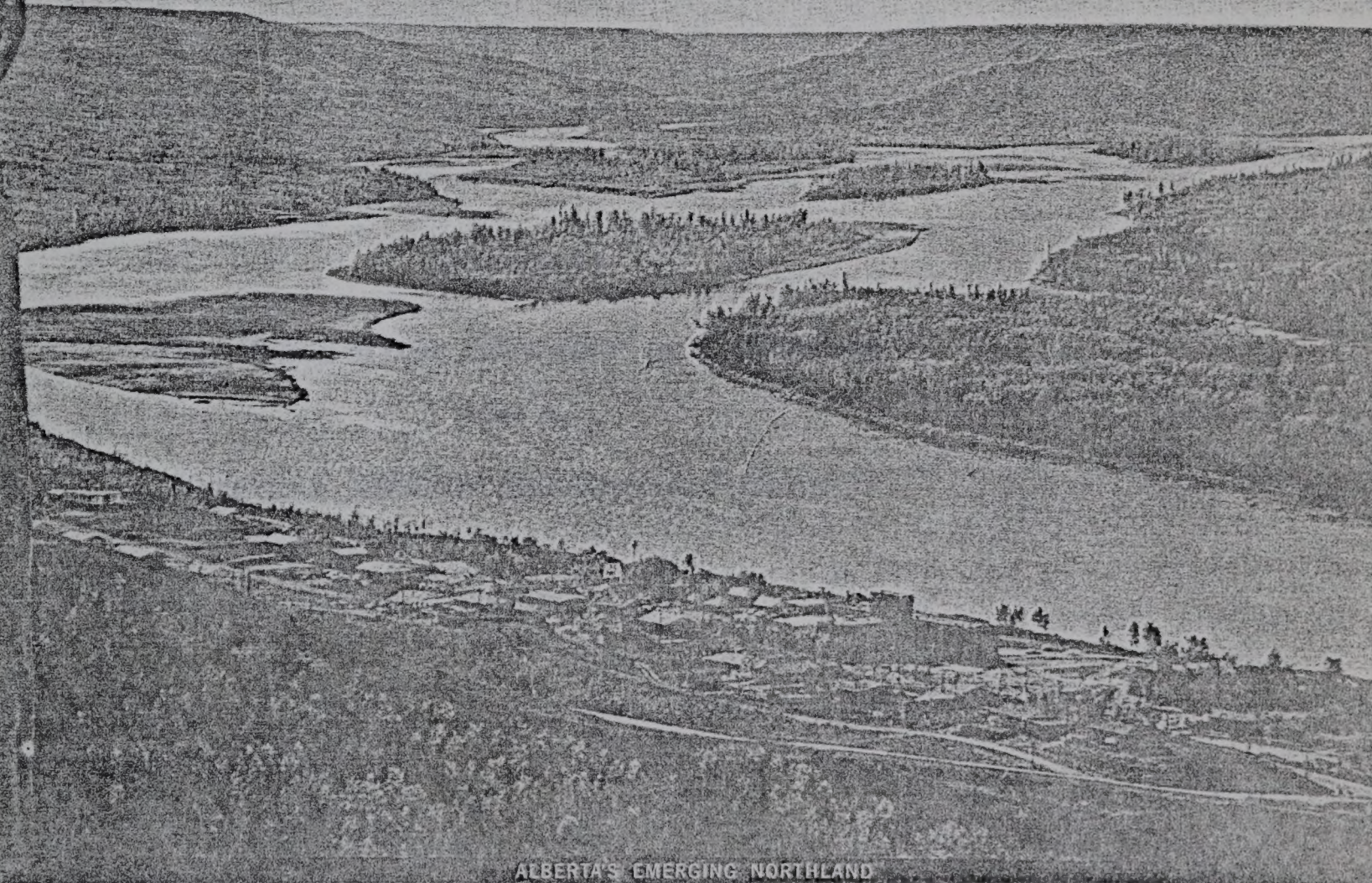
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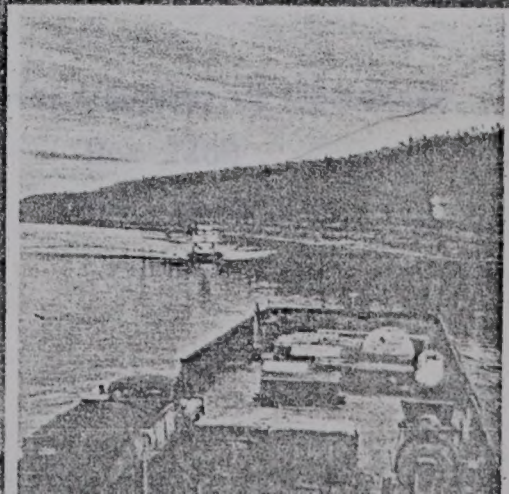
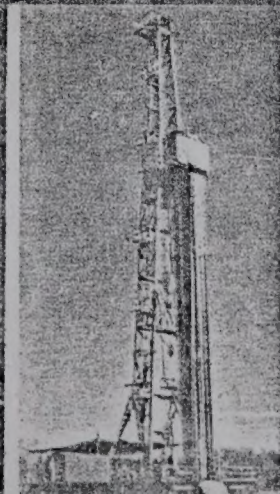


THE CHANGING FRONTIER

CONFERENCE AT
PEACE RIVER, ALBERTA
OCTOBER 5-6, 1965



ALBERTA'S EMERGING NORTHLAND



ADDRESSES

AT THE

"Changing Frontier" Conference

PEACE RIVER, ALBERTA

OCTOBER 5 - 6, 1965

Sponsored by

The Peace River Chamber of Commerce

with the

Northern Alberta Development Council

Northern Alberta Development Council

2nd. Floor

Royal Trust Building

Edmonton

Peace River Chamber of Commerce

Box 2260

Peace River

Alberta

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HON. A. R. PATRICK

Hon. A. Russell Patrick was born in Stettler, Alberta, and is a graduate of the University of Alberta. Prior to his election to the Alberta Legislature in 1952 he was principal of the public and high schools in Lacombe. He was first appointed to the Alberta cabinet in 1955, as Minister of Economic Affairs, and served in this capacity until 1959 when he was made Provincial Secretary and Minister of Industry and Development. Besides the latter portfolio, he is now Minister of Mines and Minerals, and Chairman of the Research Council of Alberta. Mr. Patrick is Past Master of the Masonic Lodge of Lacombe, past president of the Lacombe Lions Club, and a supporter of the Chamber of Commerce, the Agricultural Society, and various youth activities.

"THE CHANGING FRONTIER" CONFERENCE

presented by

HONORABLE A. R. PATRICK
Minister of Industry & Development

THE CONFERENCE PURPOSE

I SINCERELY appreciate the invitation extended to me to attend and to participate in this conference whose theme is "The Changing Frontier". In my capacity as Minister of Industry & Development, Minister of Mines and Minerals, and as Chairman of the Research Council of Alberta, I am particularly pleased that you should have asked me to outline the Purpose of the Conference. This has presented a challenge to me to concentrate my attention and energies on the great northern area of our province—its resources, its progress and development, and its potential.

When we use the term "changing frontier" we are admitting that we are talking about something which is still new, not completely explored; something without limits or on the boundary; something with a challenge; something for which we have not yet found all the answers. The very fact that it is changing indicates hope and optimism—and for this great area, very well it should.

If this has presented a challenge to me, I am sure it has presented a challenge to every one who has taken an interest in this conference. Just as it has captured my interest and attention, I am sure it has captured the interest of each and every one of you and all the people north of the 55th Parallel. Even more important, I hope it will capture the interest of people all over Canada and even beyond Canada's borders. I commend the Peace River Chamber of Commerce and the Northern Development Council for their joint sponsorship of this project which is focusing the spotlight on this great frontier.

The timing of this conference couldn't be better. During the past fifty years we have witnessed an almost totally agricultural development of the Peace River area; a development which has proven the richness of the soil, the ability to produce perhaps the widest

variety and the best quality of crops and livestock anywhere in Canada.

But despite all this proving and development of a land of milk and honey, there has been plenty of frustration—frustration caused mainly by isolation which has retarded the rate of development and therefore severely limited the degree of prosperity which should have accompanied such a development.

Nevertheless, I think it is safe to say that the first round, or stage, of development of the Peace River portion of this frontier has now been achieved. First, because the country is nearing its agricultural potential; second, because homesteading continues now only on the perimeter of the Peace River Block. Its towns have become modern in every way, the country is served with power, first class schools, hospitals, road systems — all as good as the best to be found anywhere in Canada. It is time we took a careful look at the next stage of development of the Peace, and the part it will play in this Changing Frontier.

I repeat that this conference is timely because there is every indication that the Peace River Country is about to embark on the second stage of its development, which means pushing the frontier further north. Let us look for some of the signs of this:—

(1) A couple of years ago the Province established the Northern Development Council. It had a big job to tackle. It has just brought from the press the "Economic Report of Alberta's Peace River Country" prepared by the well known economist and student of Canada's northland, Robert Harvey, who, since starting this work, has been appointed to the Council of the Northwest Territories by the federal government and who now has been appointed a member of the Resources Railway Board by the provincial government. I

anticipate that this economic report will be a topic of great interest and a very useful resource throughout this conference. One cannot read the report without being convinced that there is every reason to anticipate a great industrial potential for Northern Alberta.

(2) The Great Slave Lake Railway, through the heart of the vast and richly potential northern portion of the Province—the only corridor to the Northwest Territories and to Pine Point—has just become a fact accomplished. There is no surer sign of immediate development than a completed railway, 370 miles long, starting from almost this very spot. For hundreds of miles agriculture will be developed, spreading out over a vast area, much of which is suitable for farming. Just as the railway extends into the Northwest Territories, so will this changing frontier be extended. It isn't difficult to get excited over the possibilities and the potential that such a vast and promising area is now assured.

(3) Hand in hand with this development is the exciting news of vast new oil resources that have just been revealed extending all the way to and beyond Rainbow Lake in the North West section. The results of the Great Slave Railway will be accelerated and expanded at terrific speed by the facilities required to open up this resource development.

(4) The announcement of "The Resources Railway" to open up access to the great resources along the western side of the Province directly into, and eventually beyond, the Peace River Block has been made jointly by the Provincial Government and the Canadian National Railway. Agreements have been concluded and the route has been surveyed. It is hoped that actual construction may get started this fall.

(5) Not only does this railway promise to open up development of vast new resources but it literally moves the Peace River area and, in fact, the whole northern area, 400 miles closer to seaboard. This promises to remove what has proven to be the greatest obstacle that the Peace River Country has encountered and which has been the cause of the slowness in development which I mentioned at the outset. This is further evidence that the efforts of the Northern Development Council have begun to bear fruit.

(6) Still further evidence is to be found in the field of human resources. The launching last year of the Community Development Program is already showing amazing possibilities. The native population which has heretofore been degenerating under welfare programs and displacement of hunting grounds by agricultural settlement is now beginning to find new hope through training for steady employment and proper housing. These people can fill a very real need through supplying a part of the working force which the industrial development will need so badly in the future if it is to maintain its pace.

(7) The great potential wealth that will be generated from the tourist trade, which benefits everybody and which depletes no resources, is starting to appear

in the wake of good highways leading to and through the picturesque Peace River area and on into the Northwest Territories. The lag in accommodation which must complement good roads for the tourist development is vanishing with the appearance of the kind of first class accommodation facility such as this one where we are holding this conference.

(8) Finally, resource development has started what is the first real boost to industrialization. (1) Last year saw the beginning of construction of the first great operation in the world-famous oil sands off to our east. Let us not forget that such developments will extend to this very area as new markets appear and the special research north of the Town of Peace River finds a way to unlock this resource. (2) The final scale-up to conquer northern Alberta's iron ore deposits is starting at this moment in the newly constructed Alberta Research pilot plant at Clover Bar, (3) while the construction of the Resources Railway assures the development of the rich coking coal, lumber and pulp resources. Surely we don't need any further proof that we are at this very moment embarking on the second stage of development of the Land of the Mighty Peace — proceeding from the agricultural development stage to the industrial development stage. This means that we must focus our attention further and further north beyond the land of the Peace, as we look at the "Changing Frontier".

As a result of a meeting last month between Federal and Provincial ministers, a survey committee was established which I hope has moved us a step closer to opening up the rich mineral resources of the Precambrian Shield of what is now the Wood Buffalo Park.

As we examine the program of this conference "The Changing Frontier" we can't help but be impressed by the topics of the addresses and panels that make up the two-day agenda. But even more exciting is the make-up and calibre of the participants who have been attracted to the conference. The committee has succeeded in drawing the very top-flight people from industry, from resource development, from the field of transportation, from the lumber industry, from the oil and gas industry, from agriculture and from all levels of government—federal, provincial and municipal.

Congratulations to the committee for the idea of this conference, the organization and the timing! The results—well, the people who have been attracted to the conference must be indicative of the importance of the theme of the conference.

What a golden opportunity this affords Albertans and the whole world of getting a picture of Northern Alberta's destiny! How timely it is to be able to put together this exciting mosaic into a true picture of this changing frontier. Surely we can anticipate that when this kaliedoscope comes to rest we will see that the Peace River will no longer be a frontier—but rather that it has found the means of achieving the growth in population that it has always needed and that it will be ready to serve the new frontier that extends far beyond its own northern boundaries.



T. G. WRIGHT

Thomas G. Wright was born in Pennsylvania, and received his degrees of B.S. in Forestry from Pennsylvania State University, and M.F. in Forestry from Duke University. He was a member of the Faculty, Department of Forestry at the University of British Columbia in 1940-43 and 1947-48, spending the four years between as an Engineer in the Forestry Battalion, U.S. Army in Europe. From 1948 to 1962, he was Chief Forester, Canadian Forest Products Ltd., Vancouver, B.C., and in 1962 was appointed Dean of the Faculty of Forestry, University of British Columbia. He left this post in 1964 upon his appointment as General Manager of Forest Operations, Canadian Forest Products Ltd.

FUTURE PULP AND PLYWOOD DEVELOPMENT IN NORTHERN ALBERTA⁽¹⁾

presented by

THOMAS G. WRIGHT⁽²⁾

I AM complimented to be asked to address this group today on the subject of future pulpwood and plywood development in Northern Alberta. This is a bold assignment for me to undertake since I do not consider myself to be particularly well informed on the forest resources or the forest industries of Northern Alberta. I have had the great pleasure, however, of working for a while in the Grande Prairie area in connection with the lumber and plywood operations of North Canadian Forest Industries Limited. It was a delightful experience to travel through your extensive forests and to meet the people and enjoy the scenery in this exciting region. I have never met people anywhere who are more enthusiastic or more friendly than in this great North country.

The portion of Northern Alberta lying north of the 55th parallel which we are discussing today is considerably larger in area than the United Kingdom and is almost equal in size to the forest countries of Norway or Finland. Though a high percentage of Northern Alberta is forest land, a large part of the eastern half is non-productive with widespread muskegs which present a formidable barrier to access and forest development. Therefore, most of my remarks will apply to the southeastern section known as the Central Peace Region. This region comprises approximately one-sixth of Northern Alberta and is the subject of a recent economic survey sponsored by the Northern Alberta Development Council.

I have studied Mr. Harvey's informative report on the central Peace River region, and I note from it that there are approximately four million acres of potential farm land in the region of which 2½ million acres are under cultivation at the present time. In addition,

there is an approximately equal area of forest land, most of which is owned by the provincial government. Yet while the forest land occupies approximately half of the productive area of this region, at present it is contributing only about ten percent of the value of primary production in the Region. This forest production consists of lumber and plywood operations. The possibilities of expansion in lumber and plywood are limited, however, because of the basic shortage of timber of a size large enough to support them.

As you probably are aware, the vast forest fires which have swept across this region during the past several decades have destroyed huge areas of saw-timber stands which are now replaced by young forests of white spruce, lodgepole pine and poplar. These younger stands contain trees of small size which, while not suitable for conversion to lumber or plywood except to a limited degree, are ideally suited for conversion into pulp and paper. Thus, while the great fires of the past have destroyed huge quantities of merchantable timber, nature has healed the wounds by establishing extensive stands of thrifty, fast-growing forests which in time will supply the raw materials for a new expanding pulp industry. It is an ill wind which blows nobody good, and the winds which carried the fires through the forest did not destroy the basic resource, the forest soil, but only replaced the old forest with a new forest which in some cases is more thrifty and which is growing more rapidly than the original stands which occupied the land.

It is particularly exciting to look upon the great forests of lodgepole pine, or Jack pine, as they are more commonly called. You are all familiar with these dense Jack pine stands in which the trees frequently

(1) Talk delivered at the conference, "The Changing Frontier" at Peace River, Alberta, October 5, 1965.

(2) General Manager, Forest Operations, Canadian Forest Products Ltd.

grow "as thick as hair on a dog's back". Because of the tendency of Jack pine trees to grow close together in dense stands the individual trees have a tendency to stagnate because they cannot overcome the terrific competition for growing space. Although the individual tree volume within these stands is relatively small, the number of trees is so great that the total volume per acre may be equal to or greater than that of spruce stands containing larger-sized trees.

During the past several decades the lodgepole pine forests have made a comparatively small contribution to the economy of the Region. Fortunately, however, the lodgepole pine trees make excellent pulp. Indeed the first pulp mill in Canada to use lodgepole pine on a large scale was the mill of North Western Pulp & Power Limited at Hinton, Alberta. Subsequently, other pulp mills using large volumes of lodgepole pine have been built or are under construction in British Columbia. Western Canada is now entering a new exciting era of forestry development based upon utilization of spruce and pine pulpwood stands. We are all familiar with the huge expansion in the pulp and paper industry which is now taking place in the West.

In addition to its increasing value as a pulpwood tree, greater volumes of lodgepole pine are being manufactured into lumber because of the perfection of sawmilling techniques for conversion of small logs. As a result of changing economics and changing technology, therefore, this lowly and frequently ignored Cinderella tree is now looming on the horizon as a future economic giant of the West.

Not all of the lodgepole pine stands consist of small trees. A notable exception are the stands which lie in the Smoky River area south of Grande Prairie which provide the raw material for the plywood operations of North Canadian Forest Industries Limited. In this region, a comparatively small area of forest land escaped the forest fires of the past two centuries and as a result a lodgepole pine stand became established which is now about 160 years old. In addition to being very old for a lodgepole pine forest, this stand also is growing on an exceptionally rich forest soil so that the pine trees have achieved a comparatively large size. This is one of the finest lodgepole pine stands in Northern Alberta and it probably is one of the finest stands of this species in North America. The stand contains numerous trees which are between 18 and 24 inches in diameter at the stump which is exceptionally large for lodgepole pine. The trees are sound and clean and the larger logs are yielding a good grade of pine plywood.

Unfortunately, the area of these prime quality pine forests is limited in extent and I would expect that very little expansion of plywood manufacturing is possible in the Central Peace region.

In addition to the lodgepole pine stands which I have described, there are approximately equal areas of spruce stands and of hardwood stands in the Central Peace River District. Spruce is the number one tree in Canada, comprising the major volume in every one of the ten Provinces and providing the major raw material supply for Canada's forest industry. Because of the length of the spruce fibre the tree can be converted into pulp and paper of excellent quality. When the

trees are large enough they can be manufactured into lumber of good quality which is competitive in major North American markets.

The spruce lumber industry of Alberta has made a very important contribution to the development of the Province. Even though the industry has been forced to operate in the past without the benefit of markets for mill residues, and in spite of heavy transportation costs to distant markets, the lumbermen through efficiency and aggressiveness have maintained their competitive position. They are now faced with dwindling supplies of accessible timber which is large enough for lumber production, although their position will be strengthened when the pulp industry enters the region on a larger scale.

The pulp industry and the lumber industry are basically more complementary than they are competitive, each contributing to the other in an integrated forest economy. The pulp industry provides a market for the slabs, edgings, trim and logging residues which are by-products of lumber operations, while at the same time the operations of the pulp industry tend to generate a certain volume of logs which are suitable for lumber manufacture.

In most other major pulp producing regions, a significant portion of the wood supply for the pulp mills is being derived from chippable residues of the sawmilling industry. Use of these sawmilling residues is resulting in lower wood costs for these pulp mills and is providing an added source of income for the lumber industry. Since the lumber and pulp industry support each other, the encouragement of a strong, stable sawmilling industry needs to be considered in areas where pulp mill development is being promoted or planned.

The extensive stands of poplar in the Peace River area are practically worthless today in an economic sense, although in an aesthetic sense they certainly add beauty to the landscape. The lovely white trunks of the aspen trees and the vivid gold colours of the aspen foliage in the autumn are characteristic of features of the whole North country. Large areas of poplar forests are located close to roads and communities and hence could provide low cost raw material for industry if the trees could be converted into saleable products. Unfortunately, however, even though poplar can be manufactured into pulp it is not likely that poplar stands can be commercially utilized for several decades in the future because of the lower density of the wood and lesser value in the manufactured state. Nearly half of the combined forests of Canada and the United States consist of hardwoods. In the United States alone the annual growth of hardwood timber is more than double the hardwood cut. Huge areas of hardwood forests lie close to the major population centers of eastern United States and Eastern Canada so that western hardwood timber faces very severe competition for limited markets.

In Quebec and Ontario and also in Michigan and Wisconsin in the Lake States region a considerable volume of poplar which lies close to conversion plants is now being converted into pulp. Because of greater freight costs, however, it is not likely that economic utilization of poplar stands in Alberta can be achieved for many years to come.

Still, all is not lost because if you look closely you will see the spruce trees poking their way up through the aspen forests. The spruce trees are tolerant of shade and gradually move in beneath the poplar stands which act as a "nurse crop" for the young spruce trees. Over a period of time the poplar forests tend to be converted gradually into spruce stands.

As I have indicated, the Central Peace River Region contains a large area of productive forest land and a large volume of timber of pulpwood size which ultimately can support an important pulp and paper economy. The topography of the region is very favourable, the trees are sound and although of small size they lend themselves to economical harvesting by modern mechanical logging techniques.

This region also has another important advantage for the ultimate development of a strong forest economy. This is the advantage of having established communities and a stable labour force. There are now nine communities in the region which have a population in excess of 1,000 persons each. These communities contain a total population of 59,000 persons. The population is supported by an economy based primarily upon farming, and since farming is a seasonal enterprise a large labour force would be available in the off-season to carry out winter logging operation. A high degree of integration could be achieved between farming and forestry, giving stability and strength to each sector of the economy. This is a basic pattern which is quite similar to the forest economies of Scandinavia and many parts of Eastern Canada where farms and forests lie side by side and the workers move back and forth according to the season of the year.

In many parts of the world today efforts are being made to reduce seasonal employment and to engage woods labour on a year-around basis. At the same time, it would appear that a labour force alternating between forestry and agriculture could be ideally adapted to the particular climatic conditions and to the local requirements or resource development of the Peace River country. The extremes of climatic conditions between winter and summer are so great that industry must make appropriate adjustments if local natural resources are to be fully developed. Furthermore, the great mobility created by modern roads and modern means of transportation makes it increasingly possible for workers to live in settled communities and commute to their jobs on the farm or in the forest.

The Central Peace River region has timber and it has people. You are naturally asking: Why then has the pulp and paper industry not yet arrived? I do not consider myself to be well informed enough about conditions in Alberta, nor do I consider myself enough of an expert on the pulp and paper industry to answer this question with authority.

It is an extremely difficult assignment to analyze all of the factors which bear upon the opportunities for new industry to become established in new regions in such a highly competitive enterprise as the forest products industry. If the Central Peace River Region or any other region is to establish a new pulp and paper industry it must do so in competition with all of the present and potential pulp and paper producing regions in the world, because this is an internationally-

based industry in which the products are shipped to all corners of the world.

From the point of view of long term demand for pulp and paper, every available forecast predicts an enormous increase in world consumption over the coming decades. The expanding world population combined with greatly increased standards of living will create vast new markets for pulp and paper. In anticipation of this increasing demand, a dramatic expansion of pulp and paper manufacturing capacity is now taking place in several parts of North America, including the Southern Pine region of the United States, Eastern Canada, Western United States and British Columbia. Indeed, the current expansion is so great that knowledgeable people in the industry are predicting a temporary over-supply of pulp on world markets during the years 1966-1971. If this prognostication is correct, there will be some slowing down or deferment of expansion plans during the next few years. As a case in point, the proposed new pulp mill at Houston, B.C., a joint venture of Bowaters Paper Co. and Bathurst Paper Co. has been deferred until 1971. The Bowater-Bathurst group is a strong well-financed partnership with strong market connections which apparently has accepted the realities of the current world pulp market situation.

In the long pull, however, there can be no doubt that the expanding wave of the pulp and paper industry ultimately will reach the Central Peace River Region with a consequent increase in economic development of this area. The time of arrival of the pulp industry will depend upon many factors, one of the most important of which is the net sum of competitive advantages and disadvantages of the Peace River region in comparison with the other competitive forest areas in the world. I have already described some of the advantages in timber supply and timber quality of this region. I have emphasized that the existing communities and the established population comprise a great asset to the area.

At the same time, there are some disadvantages which should be noted. The great distance of the Peace River district from the forest products markets of the world means that freight rates to market are higher than in many competing regions. Forest products from the Peace River area must be sold primarily in North American markets after absorbing comparatively high rail transportation costs. Because of its distance from the sea, the region cannot capture overseas markets in the same way as, for example, the pulp mills of coastal British Columbia, Washington and Oregon are able to do.

Secondly, the rigorous climate which was described earlier, while providing some advantages such as low cost logging on frozen ground during winter time, also creates disadvantages by making it necessary to carry out seasonal operations. While this problem of seasonal operations can be ameliorated by moving workers from farm to forest, at the same time it makes it necessary for pulp companies to carry expensive inventories of wood for long periods of the year and exposes the logging operations to the hazards of spring break-up and fall freeze-up with which you are so familiar. The development of a more extensive network of all-weather roads will help the situation, as will the likely develop-

ment of improved forest harvesting methods which are adapted to logging under conditions of gumbo soils and muskeg. In this connection, there is a possibility that the perfection of balloon logging techniques could make a significant contribution to development of new harvesting methods for summertime logging in this region.

It would appear that a pulp mill or pulp mills located anywhere in the Central Peace River area would require a comparatively long wood haul. This is a third disadvantage for the development of a pulp mill here. It would be necessary for the mill to be located on one of the rivers and probably near one of the communities so that pulpwood would be hauled considerable distances through farm lands to reach the mill. Long wood hauls are common in the pulp and paper industry and with good roads and modern hauling equipment reasonable costs can be attained. However, the mill with the long haul is at a competitive disadvantage in comparison with the mill which has a short haul and I would estimate roughly that the cost of manufacturing pulp in this region would be increased by approximately five percent over competing mills which have shorter hauls. Hauling cost is only one element and other more advantageous factors such as logging cost and wood quality may well overcome the hauling problems.

A pattern of wood handling and transportation which might well develop in this region would be one where the wood is hauled from the forest to the nearest main highway in winter where it would be stored at the roadside for later transportation to the mill during the summer. This arrangement would extend the length of the hauling season with consequent improved efficiency in the use of men and vehicles.

A fourth obstacle to the establishment of a new pulp and paper industry is the very large capital investment which is required. The cost of new mills being erected at the present time in North America generally ranges between \$50 million and \$100 million for each pulp mill. In addition to the cost of the mill, large investments also are necessary for roads, equipment and other facilities which are required to develop a logging and wood supply organization. The difficulty of attracting such large capital investments is one of the obstacles to establishing a new pulp and paper industry in a new region.

It is frequently more economical for a pulp company to expand an existing pulp mill than to build a new one. Since many basic facilities are already established at the present mill site the existing mill can be expanded at less capital cost per ton of daily production than the cost required for a new mill. Much of the world-wide expansion in the pulp and paper industry since World War II has been based upon increasing the capacities and the efficiencies of existing mills.

Increased timber yield in developed forest regions also has contributed to the pulp and paper industry expanding its operations in its present locations rather than moving into new areas. A recent report by the U.S. Forest Service states that the growth of softwood timber in the United States exceeds the cut by twenty-five percent. Furthermore, net softwood growth is steadily increasing because of improved fire protection and intensified forest management practices. For this reason and also because of changing utilization patterns

it is estimated that production of pulpwood in the United States will increase 214 percent above present levels by the year 2000. This means that Canada will continue to encounter heavy competition from home-grown timber in the export markets for its pulp and paper products.

I would like now to make a few remarks about the plywood industry.

The production of plywood in Alberta was first based upon utilization of the abundant poplar tree to manufacture poplar plywood. Unfortunately, peeler quality poplar is very scarce since trees which are large enough to cut into peelers are usually defective as a result of decay or windshake. Existing Alberta plants have had to augment their dwindling supplies of poplar peelers with lodgepole pine or spruce peelers and the plant in Grande Prairie now cuts only about 15 percent poplar logs.

A factor which will have an important bearing upon plywood production in this area is the current market situation. A large over-capacity for plywood production exists in Canada today as a result of the recent expansion of existing British Columbia plants and the entry of several new plants in Eastern Canada and British Columbia. Despite the construction boom in progress in Canada today, most plywood plants were forced to curtail production during the first six months of this year. During the past two years, an outlet for the excess production has been developed through exports from the Coastal British Columbia plants to Great Britain. About twenty percent of Canadian plywood production has been exported to Great Britain during recent months. As a result of Great Britain's balance of payments problem, the continuation of this export business is in jeopardy. A twenty-five percent tariff excludes Canadian plywood from the American market. It appears certain that the present plywood production capacity of existing Canadian plants will more than satisfy the demand for plywood for many years to come. A contraction of demand in Canada, or payment difficulties in the British market will inevitably result in further curtailment of present plywood plant production.

As in pulp and paper, it is possible for new plywood production facilities to become established in the face of a contracting market if special production advantages are possible. However, if we examine the potential of Northern Alberta from this point of view, we find that the plywood industry has few advantages working for it but instead faces several difficulties which hinder expansion plans.

Probably the major difficulty which a plywood plant experiences in Northern Alberta is the small peeler log size and the deficiency of clear, high quality veneer for face stock. The average size of log in coastal British Columbia plants where 80 percent of Canadian plywood is produced is about 30 inches. In Northern Alberta, the average peeler log size is only 13 inches and yields almost no clear veneer. Though specialized equipment has been designed to utilize these small logs, an Alberta plywood mill is placed at a serious disadvantage in relation to its British Columbia competitors.

More serious than the problem of the small peeler is the problem of the small residual sawlog. If more than thirty to forty percent of a stand is cut into peeler

logs in Alberta, conventional sawmills cannot economically process the small residual top logs into lumber. The plywood industry in Alberta must bear the extra costs of utilizing the portion of the tree which is not suitable for peeler logs.

Since peeler logs must be limited to a small part of the timber cut, it follows that they must be drawn from wide areas with a consequent increase in hauling costs. Unlike the sawmilling industry, plywood operations cannot be moved to new timbered areas when access is provided. The resulting high transportation cost for peeler logs looms as a major obstacle in the expansion of plywood operations in Northern Alberta.

One naturally enquires whether it is possible to undertake some other form of wood conversion which does not require such a heavy capital investment as pulp and paper. For example, the manufacture of particle board is sometimes mentioned as an alternative to the manufacture of pulp. Since a particle board mill can be constructed for as little as \$500,000 there would appear to be a great advantage in this type of manufacture.

The term "wood particle board" is generally accepted as describing a product comprised of wood waste, or other low-value wood, which has been reduced mechanically to small particles which are bonded together under heat and pressure by means of a resin binder to form a board having properties similar to wood.

Particle boards can be classified into two basic groups, according to the type of particles they contain:

a) **Chipboard**

Chipboard contains random sized particles produced by breaking down the raw wood in a hammer mill or disc grinder.

b) **Flakeboard**

Flakeboard contains wafer-like particles produced by shaving or flake producing machines. These machines have special cutting knives which slice the raw wood along the grain in a manner similar to veneer cutting. The length and thickness of the flake can be controlled and a very uniform particle can therefore be produced.

Flakeboard is stronger than chipboard but is also more costly to produce.

While I am not too well informed on the problems of manufacturing and marketing particle boards, I am given to understand that the distance from major markets can be a very significant factor in the establishment of profitable operations. Since particle board is a low value and high weight product, freight costs can form a high proportion of the final delivered price if the product is shipped long distances. Unless a local market within a reasonably short radius of the manufacturing plant is assured, it is unlikely that particle board operations could be successful ventures. Under these circumstances, it appears to be unlikely that particle board manufacture will provide the key to the development of the forest resources of the Central Peace River Region.

It perhaps goes without saying that government stumpage policies can play a vital role in encouraging new industry. The price which is charged by the Crown

for timber on the stump must be sufficiently low to provide an adequate margin for profit and risk. Excessive stumpage can "kill the goose which lays the golden egg". It is an accepted principle that stumpage appraisal should allow full costs of production including all indirect costs if industry is to prosper. A healthy, profitable industry yields revenues to the government which exceeds many times over the value of stumpage which is charged for standing timber. Governments at the local, provincial, and federal levels all receive revenues in the form of land taxes, sales taxes, personal and corporate income taxes, as well as a host of other charges and fees. The important objective is to get the industry established and to create an economic climate which will enable industry to prosper and to expand. If this climate can be achieved not only will industry prosper but government revenues also will flourish.

The Province of Alberta has established low stumpage rates for pulpwood but the stumpage rates for sawtimber and plywood timber have reached very high levels. Under an integrated forest economy all forest products—lumber, pulp, plywood and other products—contribute their share to the over-all prosperity of the industry and all sectors should be on the same economic footing. This is a very complex and difficult matter because uncontrolled bidding for timber sometimes pushes the price of stumpage beyond the level where industry can make a profit. I do not propose to offer any solutions to the stumpage problem at this time but only suggest that cooperative efforts by industry and government to hold stumpage charges at reasonable levels will benefit the community as a whole.

Another area in which government action is capable of modifying obstacles to the development of forest industry is in the field of forest access. We have mentioned that high hauling cost is a major disadvantage for the industry in Northern Alberta. Certainly, the new "resources railway" which the government has announced will be constructed into the forest areas south of Grande Prairie is a major step in this direction. The government is already building forest protection access roads and often the route and construction standards of these roads can be modified to provide access for the harvesting of timber.

If my figures are correct, the present average value of production from lands presently under cultivation or under pasture is about \$20 per acre. Pulpwood stands of pine and spruce can yield about the same value of products per acre per year if the value is measured in terms of selling price of pulp at the mill. Hence if all the forest lands in this region are ultimately brought up to full management, including the conversion of hardwood stands into softwoods, forestry production can be brought up to a level equal to agricultural production.

It is just a matter of time until the Central Peace River will support a healthy integrated forest products industry. If we look far enough into the future we can foresee the day when the value of production from the forest lands of this region will equal the value of production from the agricultural lands. The rich agricultural soils and forest soils will be given integrated management by a stable, permanent population to yield crops of grain, vegetables, livestock and trees in perpetuity.



A. J. HAMILTON

Mr. Hamilton was born in Scotland and emigrated to Canada at an early age settling in Edmonton, which has been his home ever since. He graduated from the University of Alberta with a Bachelor of Commerce degree in 1939 and in 1942 became a member of the Institute of Chartered Accountants of Alberta. Shortly thereafter, he became a partner in Winspear, Hamilton, Anderson & Co., a chartered accounting firm operating in Western Canada.

In 1946, he became a director of Swanson Lumber Co. Ltd. and in 1950 was appointed managing director, a position that he has held since that time. He is also a director of several other industrial companies operating in Canada. He is also treasurer of Peace River Mining and Smelting Co. Ltd.

FUTURE SAWMILL DEVELOPMENT IN NORTHERN ALBERTA

presented by

A. J. HAMILTON

1. Introduction

In using the term "Sawmill Development" I have concerned myself with the industry that has lumber as its principal product and which generally comprises the logging of timber, sawing of logs, and the planing of the rough lumber product of the sawmills.

Since early colonial days lumbering has been one of our leading industries, and its products important to both domestic construction and as export commodities. While there is a tendency today to emphasize our companion woods industries with their glamorous pulp and paper and plywood plants, the fact is that the lumber industry as such in Canada as a whole and in Northern Alberta in particular, is still a vital industry and there is every reason to believe that it will remain so for many years to come.

2. Lumber Industry in General

Before considering the lumber industry in Northern Alberta, it will perhaps be informative to consider the lumber industry in Canada, and since more than half of the lumber produced in Canada is exported we should first examine lumber in an international setting.

On a world basis, Canada is the third largest producer of lumber in the world, producing about 8% of the world's supply. In the field of international trade in lumber the movement of goods from Canada to the United States and from Scandinavia and the Soviet Union to Britain and Western Europe dominate the picture. About 80% of Canada's exports go to the United States and about 10% to Britain. In the future there may be an increase in Canada's exports to other countries such as Japan, Israel and Western Europe, but it would seem that we must continue to look to the United States for our chief export market. In this connection it must be pointed out that any restriction on the sale of Canadian lumber to the United States could have a disastrous effect on the lumber industry in Northern Alberta in particular since perhaps 80% of

our production is shipped to the United States due to our inland location and the nature of freight rates.

In 1962 Canada produced about 8½ billion f.b.m. of lumber with an estimated value of around six hundred million dollars. Of this amount, about 3% to 4% was produced in Alberta. Approximately 40% of the 1962 production was consumed domestically and the balance was exported.

Sawmilling in Canada today accounts for something like 5% of the people employed and about 3% of the value of factory shipments in all manufacturing industries. Its wage bill is one of the largest industrial wage bills in the nation and its export earnings are in the first rank.

3. Consumption of Lumber

Any consideration of the future of sawmilling in Northern Alberta must of necessity be concerned with the future consumption of lumber in the world in general and in North America in particular. North America uses about 30% of the world's lumber and Europe uses about 25%. Canada's share of the U.S. market has been growing rapidly and in 1963 amounted to 13½% as compared with 8½% in 1956.

Canada is the world's largest per capita consumer of lumber with United States a good third. The most important reasons for the heavy per capita consumption of lumber in Canada and the United States is the abundance of high quality timber of saw log size and the relatively low cost of lumber by comparison with other construction materials. It is natural that in countries, such as the United Kingdom, which have to import lumber the price is relatively higher than in Canada and therefore other materials such as bricks which are produced locally tend to be used instead.

The trend of consumption in Canada and United States is of particular significance to us. It would appear that the long term trend in per capita consumption in both countries is downwards, although increases in

population have resulted in an overall increase in lumber demand.

Commercial construction takes a sizeable portion of the lumber output but housing provides by far the largest market and housing demand depends principally on the rate of family formation, plus such factors as mobility of population and the replacement and conversion of housing. Some of the main competitors with lumber are plywood, fibre boards, plaster boards, concrete, aluminum and other non-wood products.

In considering future trends in the consumption of lumber it might be useful to determine which factors would tend to increase the use of lumber in the future and which factors would tend to decrease the use of lumber by the substitution of other products.

Generally the favorable factors are as follows:

1. It is easy to work with and requires a minimum of high priced tools or equipment.
2. It has good strength for weight properties, comparing very favorably with other structural materials.
3. It is often the cheapest structural material available.
4. Wood has wide esthetic appeal. This is particularly notable in churches, halls and other public structures where laminated beams are widely used.

The following are some unfavorable factors:

1. It is subject to certain defects both natural and by manufacture such as variances in moisture content, knots, and twist or crook.
2. The maintenance cost of lumber in exposed places may be high.
3. Increasing wage rates in the building industry have led to the substitution of other products with a lower labour factor in usage.

This latter point is one which we in the lumber industry should consider very carefully. Anything which can be done in the manufacture of our product leading to a saving of labour in the use of lumber such as packaging for ready handling by lift trucks or pre-cutting to size at the sawmill rather than on the job site, may be an important factor in the continued use of lumber in construction and in industry in general.

4. Royal Commission Estimates

In 1957 The Royal Commission on Canada's economic prospects authorized the publication of a study "The Outlook For The Canadian Forests Industries". After weighing all of the factors which they considered to be relevant, the study concluded that during the period from 1955 to 1980, lumber consumption in North America would show a substantial increase in spite of a decrease in per capita consumption. It estimated that the total production in Canada in 1980 will be of the order of 11 billion f.b.m. This compares with 7.3 billion feet in 1954 and 8.5 billion feet in 1962. The study has, however, a word of caution. It points out that costs of production in the industry have been increasing steadily and that wages which are a very important item of cost not only have risen in relation to those paid in other industries but the output per man hour has fallen steadily behind that in most other sectors of the economy. This has resulted in a tendency for the cost of producing lumber to rise more rapidly

than the cost of manufacturing in general. Improvements in this aspect are regarded as a necessity if the projected increase in lumber consumption and lumber production are to be realized.

5. Timber Resources of Canada

The Canada yearbook 1965 gives the following estimates of standing timber by type and size and by Provinces in 1963.

	Standing Timber (In millions of cubic feet)			
	Large	Coniferous Small	Total	Broadleaf Total
B.C.	292,020	65,112	357,132	19,789
Quebec				
& Ontario	81,286	69,739	151,025	68,677
Alberta	13,241	17,656	30,897	24,063
Other Provinces	13,725	58,498	72,223	28,077
	400,272	211,005	611,277	140,606

It will be noted that British Columbia is the dominant Province in total quantity of saw log size timber followed by Quebec and Ontario and then Alberta in that order. I believe that it is fair to say, however, that in quality and size of trees, Alberta is second only to B.C. Of the small conifers in Alberta perhaps 40% is spruce and over 80% of that is young and immature, having a good chance of growing to saw log size. The effect of this would be that perhaps 5 billion cubic feet of the small conifers might well be classed as saw-log type timber available for saw-mills of the future.

It will also be noted that Alberta has a relatively high volume of broadleafed trees. This is mainly popular and so far it has not proven to be suitable for lumber production although it is important in plywood production and may in the future become important in the pulp and paper industry.

6. Timber Resources of Northern Alberta

The Alberta Forest Service have supplied the following information with respect to the timber resources of Northern Alberta. (By Northern Alberta I refer generally to that portion of the province North of the 55th parallel.)

	Sawtimber M f.b.m. (10" + DBH)		
	Inventory	Annual Gross Allowable Cut	Present Production
White Spruce	21,261,400	354,400	
Balsam Fir	478,500	11,900	
Pine	5,500,200	110,000	
	27,240,100	476,300	79,675

It will be noted that present production in Northern Alberta of 80 million f.b.m is well below the gross allowable of 476 million f.b.m. In addition, there is a substantial amount of small spruce presently included in a pulpwood classification that will grow to saw log size timber. While an allowance must be made for depletion of resources by fire and disease and while some of the timber is presently economically inaccessible,

there is no doubt that Northern Alberta has the resources to support a lumber production of many times the present volume being cut. A lack of access to these timber stands has been the main deterrent to the expansion of the industry in the past. The construction of the Great Slave Lake Railroad has already doubled the production of lumber north of the Peace River and further expansion is indicated. Good roads reaching east and west of this railroad are still needed and no doubt will be built over the next few years. Similarly, there are other areas of Northern Alberta with stands of mature timber which can support a substantial annual cut which will become economically feasible as roads or railroads are built closer to them in the future.

None of the above figures make any allowance for the timber in Wood Buffalo Park which at the present time is administered by the Federal Government but which is within the boundaries of Alberta. This area has the problem of inaccessibility, but in spite of this, there is an annual production of about twelve million f.b.m. per year at present and it is expected that this will increase to about thirty-five million f.b.m. within three years. The timber stands are expected to maintain this cut for many years.

7. Lumber Species

The following is a summary of lumber shipments in Canada by species in 1962.

Spruce	2,410,316 FBM
Douglas Fir	1,958,532 FBM
Hemlock	1,382,378 FBM
Cedar	551,793 FBM
Other Species	1,483,715 FBM
	<hr/>
	7,786,734 FBM

Spruce, the leading species, accounting for 31% of shipments is found in most forested regions of Canada except the Coastal area of B.C. which runs heavily to Douglas Fir, Hemlock and Cedar.

In Northern Alberta Western White Spruce is our dominant specie with pine next in line. Generally, spruce lumber is a very acceptable product. It competes very favorably with other species on a weight strength basis; it takes and holds nails well; it paints beautifully and glues easily and tightly; it has a good appearance due to the bright white wood. These properties make it ideal wood for many types of construction and industrial uses. In our experience, spruce is gaining competitively with most other species. This is perhaps due to the marketing of a better product. We now ship mostly dry lumber and grading and grade stamping is compulsory. As a result customers, particularly in the United States, are placing orders for Western White Spruce confident that they will get a uniform, well manufactured product that will be on grade and for many uses will be more than competitive price wise with other species.

8. Nature of the Lumber Industry in Canada

A fundamental characteristic of the Canadian lumber industry is the very large number of mills in the country and the small size of most of them.

In 1953, out of a total of 8,194 sawmills, 6,647 reported production of less than 1,000,000 f.b.m. per annual (that is a production having a value of less than \$50,000 to \$60,000 per year). Of recent years there has been a definite trend toward larger mills although numerically the smaller mills still dominate the industry.

One reason for the large number of sawmills is that they tend to locate as close as possible to the source of raw material. Since about 50% of a saw log is lost in the manufacturing process, it is usually uneconomical to haul logs a long distance to a sawmill. This tendency of sawmills to be located right in the timber has been the rule in Northern Alberta as in the rest of Canada in the past. Mills have usually been designed to such a size as to operate economically on the timber within a relatively small radius. Many mills are semi-portable and are set up for a three to five year operation. This tendency to saw lumber by means of small portable mills scattered throughout the timber results in the complete loss of the sawmill waste. Such material is of relatively low value in relation to its weight and it is generally uneconomic to try to use it for pulp or other wood consuming industries. In most instances, the cost of collection, processing and transportation of wood waste exceeds the value of the material. This is one of the basic problems of the lumber industry in Alberta.

While there are a great many small mills in Canada there are also several very large mills. A recent survey indicated that the largest 5% of the total in number, produced about 50% of the production. These are mainly the large integrated sawmills on the coast of British Columbia. Logs are moved generally by water transportation to these large centralized sawmills. Here the better logs can be sent to a plywood plant as peelers, the poorer logs used for pulp and the remainder sawn into lumber. The sawmills are usually equipped with barkers and chippers so that slabs and edgings, normally burned in a small mills, are made into chips which are shipped to the pulp mills. This integrated type of operation obtains a high degree of utilization and where possible it is perhaps a goal toward which everyone in the lumber industry should strive.

In the interior of B.C. several pulp mills have been constructed recently and others are in the process of construction. In Prince George for example, two pulp mills are presently being built. The effect of these pulp mills on the development of the sawmill industry in the Prince George area are beginning to be seen. Sawmills which have already been built on the railroad are installing barkers and chippers and some are already shipping pulpwood chips to Prince George. Other operators with two or more sawmills located some miles from the railroad close to the standing timber are weighing the economics involved in discontinuing the present sawmills and replacing them with a larger centralized sawmill built on the railroad to which they will haul logs. The economic question to be answered is whether the additional cost of hauling logs will be offset by better sawmill costs by reason of the large volume going through one plant combined with the revenue provided by the sale of chips.

It seems likely that twenty years from now large sawmills located on the railroad complete with barkers and chippers will be the rule in the interior B.C. and

that the small, relatively inefficient, sawmill will be a thing of the past.

9. Recent Developments

In general, the lumber industry has been slow to change. The simple circular headrig which was in use at the turn of the century is still in widespread use today, and in all of the Provinces except British Columbia it is still the standard equipment for sawing logs.

In the last ten years rising wage rates and two rather severe market declines have caused lumber companies to re-assess their operations with the result that some noteworthy improvements have been made.

One of the more significant advances in the last few years has been made in the utilization of saw logs of small diameters on a profitable basis. Generally, the method is to concentrate on the manufacture of one standard item, namely lumber 2" x 4" and 8 foot long. In its simplest form the sawmill used is a "scrag" mill with two parallel circular saws set four inches apart followed by an edger with saws set two inches apart, so that the log is first sawn into a four inch cant by a pass through the two circular saws and the cant is then turned on its side and edged into 2 x 4's. This type of mill will take logs up to about eight inches in diameter. A variation of this is to use a four saw scrag with the four parallel saws set so that they will produce a two inch plank on each side of a four inch cant. In this case a double edger is usually used, one side to edge the four inch center cant into two inch pieces four inches thick and the other to edge the two inch thick planks into four inch wide pieces. This type of mill will handle logs up to thirteen inches. The significant features of these mills are high speeds and a small crew.

In both cases certain refinements can be added to improve recovery by manufacturing otherwise wasted slabs into 2x2's, 2x3's and 1x4's.

Recently, a small log mill at a Weyerhaeuser operation in the United States has been designed with four band saws comprising the scrag rather than the circular saws which I have just described. Behind the four band scrag is a double arbor edger. Both the band saws and the edger take a much smaller kerf than the standard circular scrag and the edgers used in Alberta, resulting in an improved recovery. This mill has been fully automated so that two men can handle the whole operation. The overall effect of this sawmill is to handle logs in the six to twelve inch diameter range with a minimum of labour and with high production ranging from 50 to 65,000 f.b.m. per shift. There is some doubt that this refined type of mill could be made to operate efficiently in the frozen timber of Northern Alberta during the winter months when it is accessible but there is no doubt that the ability to handle small diameter logs with a minimum of labour is becoming essential in order to operate profitably in the timber stands of Northern Alberta.

As previously stated the main product of these mills is a 2x4 8' which has been traditionally in demand for use in the framing of dwellings. The trade name is "studs" and the product is usually made more attractive from a marketing point of view by precision end trimming to 7 feet 8⁵/₈ inches, end painting for

uniformity and sealing and strapping into packages of about 1,000 f.b.m. for easy handling. On arrival at the market they can be speedily unloaded by lift truck and when delivered to the building site they are ready for immediate use. The labour saving advantage of this type of product to the consumer is obvious. The growth in production of studs in the past ten years in both United States and Canada has been remarkable.

Another trend which I touched on previously is the replacement of small portable bush mills with larger centralized mills which lend themselves to automation. Improved machinery for hauling logs, better roads, security of timber supply, and a market for sawmill waste are the determining factors in the trend toward the large automated mill.

10. Utilization of Sawmill Waste

One of the criticisms of the lumber industry in the past has been that only about 50% of the product of the log is recovered as lumber, the balance in the form of tops and branches, barky slabs and sawdust being either burned or left on the ground to rot. This criticism is valid and one which is of concern to most responsible lumber companies. Some wood particle boards and other types of wood fibre boards have in the past been made from wood waste, but these types of boards have not represented a large market for sawmill waste. Generally, public acceptance has been slow and the raw material in the form of wood waste for the manufacture of these boards is not the largest element of the total cost of these boards so the economics of shipping wood waste from a mill north of Peace River to a more centrally located particle board plant say in Edmonton is doubtful.

It would appear today that the most effective use of wood waste that has yet been found is in the manufacture of chips to be used by the pulpmills in the manufacture of their products. The manufacture of chips is relatively simple. The log is de-barked before going to the sawmill and the clean slabs and edgings are then conveyed into a machine called a chipper which cuts the waste wood into small fairly uniform pieces of wood called chips. The chips are blown into specially constructed railway cars and shipped to the pulpmills. As previously stated the sawmills in British Columbia are rapidly adapting themselves to be able to supply pulpmills with chips.

To date in Alberta there has been little or no chipping of waste wood for use by the pulpmills. The main problems are:

1. There is only one pulpmill in Alberta, located at Hinton and not many mills are close enough to Hinton to make it economical to ship chips.
2. The equipment to de-bark logs and make chips out of the slabs and edgings is quite expensive and it would be completely uneconomical to make this installation unless there is a concentration of logs available to the mill. In Alberta the scattered nature of the timber supply with relatively low volume per acre as compared with B.C. is a restrictive factor on the economic size of a sawmill.
3. There is a tendency for pulpmills to regard chips as a waste product of the sawmills and to look upon

them as a cheap source of raw materials to reduce the average cost of their total wood supply.

4. In the past there has been little security of tenure of timber resources to justify the capital expenditure required. In this connection the recent decision of the Forest Service of the Government of the Province of Alberta to put the timber resources of the province on a sustained yield basis with a guarantee to lumber companies of a continuity of supply of timber will go a long way to solve this problem.

I believe that as more pulpmills are built in Alberta there is every chance that a large volume of wood waste will be utilized in the form of chips. The lumber company will have to amortize the cost of larger sawmills on the railroad including barkers and chippers. It will also have to absorb the additional cost of hauling logs to the centralized sawmill and to pay the freight on the chips to the pulpmill. Some of these costs will be recovered by the more efficient operation of the large automatic mills but in addition a realistic approach to the pricing of chips will be required by the pulpmills. If all parties are fair in attacking the problem, there is no reason why standards of utilization for the lumber industry in Alberta cannot be greatly improved.

Summary

1. The per capita consumption of lumber in North America is trending downwards but the growth of

population will probably result in the overall consumption of lumber increasing.

2. As an industry we must exert ourselves to try to improve overall consumption. This can be done by improving the quality, making the product more attractive by packaging, painting, etc., by co-operating with the consumer in labour saving aspects such as packaging for fork lift handling, precision end trimming at the sawmill or planer, and in general, by keeping the cost of our product down to be more competitive with alternate or substitute materials.

3. We must continue to strive for better utilization both with respect to small diameter sizes of timber and with respect to wood waste.

4. If a pulpmill is built in the Grande Prairie area, there will be an accelerated trend in Northern Alberta toward larger centralized sawmills with barking and chipping facilities.

5. Canada needs to continue to export heavily to the United States and if there is no artificial curtailment in this regard, Canada's overall production will increase substantially in the foreseeable future.

6. Northern Alberta is in a favored position with respect to supplying this increased production. It has good stands of Western White Spruce, a specie that is improving its competitive position and on a sustained yield basis Northern Alberta forests can sustain an annual production many times more than the current volume.



LOUIS ZEPHIRIN ROUSSEAU, D.Sc., B.App.Sc., F.E.
Deputy Minister of Forestry for Canada

Dr. Rousseau has had 39 years of professional forestry experience in private business, government service and university teaching. He joined the federal Department of Forestry after a successful career at Laval University Faculty of Land Surveying and Forest Engineering, where he became a Faculty member in 1940 and Dean in 1954. Born at Beauport near Quebec City in 1901, he attended Le Séminaire de Québec, Canada's oldest college dating back to 1663, where he received a Bachelor of Arts degree. He then studied at the Laval School of Land Surveying and Forest Engineering and was awarded degrees of Bachelor of Surveying in 1924 and of Forestry in 1925. He spent eleven years in private practice as a land surveyor and forest engineer, and in 1937 was appointed Chief of the Division of Land Classification, Department of Colonization of the Province of Quebec.

While Professor of Forest Botany and Ecology during the period 1940 to 1962, Dr. Rousseau successively occupied the positions of Assistant Secretary, Secretary, Assistant Dean and Dean of his Faculty, and took a leading part in the development of science education in French Canada. He was also instrumental in organizing Forestry Research in the Province of Quebec, and was elected first chairman of the Laval University Forest Research Foundation in 1954.

Dr. Rousseau has represented Laval University on various scientific and forestry organizations in Canada and on the Continent, and, since joining the Department of Forestry, has chaired the North American Forestry Conference at Ottawa in 1963, and the Technical Forestry Committee in Rome previous to the XII Biennial FAO Conference, last November.

He was appointed Deputy Minister of Forestry for Canada in July 1962.

RATIONAL LAND USE

presented by

L. Z. ROUSSEAU, D.Sc., B.App.Sc., F.E.
Deputy Minister of Forestry

IT IS unfortunate that Mr. Sauvé cannot be in attendance here today in the company of such distinguished panelists. He has asked me, however, to convey to you all his very best wishes for the success of your meeting, and suggested that, with the approaching date of November 8th, you would appreciate that federal politicians are bound to spend more of their time on the hustings than in participation in conferences, conventions or panels.

As a substitute speaker, I presume you will allow me some latitude in my presentation, and therefore would like to consider a problem which has been the subject of both reasoned debate and bitter contention since settlement began in Canada. I am referring to the problem of rational land use.

While I must speak as Deputy Minister of the Department of Forestry, I would also like to feel that I can speak to you as a forester who, for many years, has been exposed to the problems which exist in much of Canada today and directly arise from a chaotic approach to land-use.

Here, in Northern Alberta, as in other parts of Canada, the major competitors in land use are primarily agriculture and forestry. Their potentials cannot be disputed. Indeed, on the one hand, even a cursory examination of the forest resource indicates that forest depletion is only a fraction of the allowable cut. On the other hand, this area contains what is probably the largest single block of unalienated land in North America which has an excellent undeveloped potential for agriculture.

Your Chamber of Commerce and the Northern Alberta Development Council are attempting to direct and accelerate the economic development of this region.

Quite naturally, you are making a "hard sell" on the development potential. But this conference demonstrates very concretely, however, that you are tackling the problem in a rational, well-considered way, since its objective is essentially to gain perspective through assessment and evaluation.

If we examine agriculture in Northern Alberta, we find that, as elsewhere, there is a drastic gradation in the economic returns from farming endeavours. Definite data on farm income is almost impossible to obtain; however, the 1961 Census did provide information on the value of agricultural sales for individual farms, and also provided data on time spent by the operator on off-farm employment. By combining agricultural sales with off-farm employment and local labour rates, it is possible to produce a reasonable approximation of gross farm income. The question of what constitutes reasonable farm income is not easy to answer, but if we strike a figure of \$3,000 — and remember this is gross income — then we find that almost 50 percent of the farms in Census Divisions 12, 13 and 15, covering most of Northern Alberta, fall below this arbitrary level. I would ask you to dwell on that fact for a moment.

In Western Canada as a whole, it is a tribute to both land quality and farm management that most farms can be described as viable commercial ventures. I do not wish to draw too close a parallel between agricultural conditions in Eastern Canada and any hypothetical situation which could, in the future, occur in Northern Alberta. Many factors are different, but one of these is present which indicates that caution should be exercised. The climate in Northern Alberta is not dissimilar to that of many areas in Eastern Canada which are also on the fringe beyond which there is little, if any, agricultural potential.

Let us refer for a moment to the specific area in which we are presently meeting, the Peace River Region. I should mention that the Economic Report published by your Council was perused most carefully, particularly the portions dealing with agriculture and forestry.

Soil surveys in the Peace River have classed about 4.5 million acres as agricultural land, of which 2.5 million are improved land with about 1.8 million being under cultivation.

It is estimated that the cultivated acreage will increase at the rate of about 70,000 acres per year for the next two decades. I cannot presume to say that this figure is excessive, but I will state quite frankly that I would want to carefully examine the evidence before I could view such a development in arable agriculture with approval.

I make this statement, not on the basis of any agricultural knowledge—for as a forester, I am sure that an agriculturist could, at a moment's notice, tell me much that I do not know. Rather I make this statement because of thirty years of observation and experience in the forest fringe areas. I have seen the results of "ad hoc" land settlement programs in Eastern Canada, where there are now tens of thousands of inefficient farms beset by problems which the individual farmers cannot hope to solve. In many cases, land is of submarginal quality, in others the farms are too small, and in still other cases both conditions exist. It is true that many of these farms date back to the days of earliest settlement, but it is also true that many of them date back to settlement policies of only twenty or thirty years ago.

Now, perhaps, I am appearing to expound pessimism. This is not the impression I would wish to create. There is no doubt that many areas in Northern Alberta have a good agricultural potential, and that this potential should be developed. My sole concern, and I am most sincere in this, is that mistakes made in the older regions of Canada should be avoided here. It is also that you should use all the expert knowledge, and all the research that is or can be made available, as the cornerstone of your development work: there is no place in Canada today for "ad hoc" land settlement programs.

In this respect, I would now wish to touch briefly on the Agricultural Rehabilitation and Development Act which is an administrative responsibility of the Department of Forestry. The ARDA program, as you know, is based on the federal legislation passed in 1961 in recognition that income and living standards, in many areas of rural Canada, are too low to be acceptable in our generally affluent society.

There are many factors, both economic and social, which tend to depress the incomes of rural people. One of the most important of these is ineffective land-use. In Western Canada this problem is fairly widespread in a considerable zone which includes most of the forest fringe and the areas immediately south of it.

The ARDA program, during its first three years of operation, has made some significant strides towards

better use of the many millions of acres of land which are ineffectively used. In Eastern Canada alone, it is estimated that there are between 16 and 20 million acres of land in this category.

The soil and water conservation activity under the ARDA program is no less significant in the long run than alternate land use. To provide you with a specific example, I wish to refer to the ARDA project being undertaken on the East-West Prairie Rivers near High Prairie. This project is for the purpose of controlling flooding conditions which affect about 90,000 acres of agricultural land of good quality where, however, spring and summer floods have hampered farming operations very seriously.

A closely related project in this area is also now under consideration, and is concerned with the effect of changing land use patterns on surface run-off waters. This project, if approved, will be carried out on the Simonette River Watershed. We have all seen that land, which is newly cleared, is often subject to erosion or drainage problems which may result very quickly in difficulties for the farmers affected. This project could be extremely useful in planning the appropriate pattern of land use in similar areas, as between agriculture and forestry. I feel sure that the guidance provided by this research would soon result in savings far in excess of the cost of the study.

In Eastern Canada, as I mentioned a moment ago, the ARDA program has resulted in considerable adjustment of land use — mainly putting submarginal agricultural land to better use, such as pasture or forestry. Land adjustment is, of course, proceeding in the West as well, and I might cite the Smoky Lake and the Kleskun Grazing Reserves, not far from here, which will carry about 2,400 and 2,000 head of cattle respectively.

The projects I have mentioned are merely examples, typical of a growing number of similar projects and studies throughout Alberta. I personally view the number of research projects as one of ARDA's most valuable contributions to better land use. Research of this kind is of direct and indirect assistance to administrators in their efforts to avoid policies which lead to low income conditions in rural areas. At this point, I should like to make two general observations about the ARDA program, from the standpoint of federal government policy.

First, while ARDA often manifests itself in physical works of one kind or another, the basic objective of the Act is to improve rural social and economic conditions. Where improvement of resource use will accomplish this, federal support is given wholeheartedly. But where the resources of a region are insufficient to support the population adequately, it is considered essential to assist rural people to seek opportunity in new occupations, and perhaps, in different areas.

The **second** general but very important point is this: The Federal Government is not prepared, under ARDA, to contribute to programs which are aimed solely or mainly at increasing the amount of agricultural land under cultivation.

In cases where soil and water conservation measures add to the income of existing farms, the federal government is prepared to assist; but where new farms are being created by clearing of land or similar measures, the federal government tends to view such activities as matters of provincial rather than national concern.

I would like now to describe in some detail what promises to be an extremely useful tool with which decisions on land use can be attained: The Canada Land Inventory, possibly the most important single research project so far undertaken by ARDA. Started in 1963, this inventory will be a comprehensive survey of land capability for various purposes. It will cover the entire settled and adjoining fringe areas of the country, and include assessment of land capability for agriculture, forestry, recreation and wildlife. Present land use will be mapped, and assessment made of relevant social and economic factors.

The Canada Land Inventory grew out of recommendations made by the 1961 Resources for Tomorrow Conference, where specialists stressed repeatedly that judgments would be fallible and the mistakes costly if governments ventured into regional development planning, or into programs of land use adjustment, in the absence of concrete data on the land resource potential.

The Canada Land Inventory is the first major land capability study to be carried out in Canada, and the fact that its estimated cost is 18 million dollars, provides some indication of the size of this research project.

The need for more definitive information on soil capability for various uses has long been recognized by land use planners everywhere in Canada; but there are substantial reasons why this major inventory was a long time in coming. Many programs of classifying and mapping soils had to be done before soil capability studies could be attempted on a major scale. Data on climate, present land use and productive capacities of land had to be accumulated over many decades as a basis for estimates of soil capability. Of the many programs of this kind, the Soil Survey was the most notable; it built up our knowledge of the physical characteristics of our Canadian soils.

From the viewpoint of the land use planner; however, the information available on soils, topography, climate, etc., has important limitations. First, the Soil Survey is mainly of agricultural land, and comparable data on forest lands were not obtained. Secondly, the capability of soils rests on more factors than the physical characteristics, and these had not been assessed. Thirdly, much of the data on soils is not comparable between provinces. Fourthly, there has so far been no means of comparing land capability for various uses: this is to say, there has been little basis except personal judgment for deciding if a given piece of land would be most valuable for a given use such as forestry, recreation, wildlife production, or agriculture.

The Canada Land Inventory is expected to provide these missing facts and judgments, and therefore promises to be a valuable national instrument for land

use planning. The published capability maps produced by the Inventory will be at a scale of 1:250,000, and although they will not provide the detailed information needed for management of small tracts of land, they will provide extremely valuable information for resource development planning for municipalities, provinces and Canada as a whole.

More than 100 agencies of the 10 provincial governments and the federal government are contributing to the Inventory, the latter paying the whole cost of the project, while the former provide most of the skilled manpower and other facilities.

As a point of interest, I might mention that the millions of items of information being collected in this huge and complex cooperative venture will be handled by computers. Even the actual drawing of maps will be assisted by computers, and the technique developed in this instance is believed to be the most advanced in the world.

May I add that, at the present time, all phases of the Canada Land Inventory are in progress in Alberta, and that the entire program should be completed by 1969. As the data become available, planning and development groups such as your own will, I am sure, find it invaluable as a basis for rational land development.

Mr. Chairman, Gentlemen, you may feel at this point that, as a forester speaking on a forestry panel, I have directed the majority of my remarks to agricultural development. Perhaps, at a later session, one of the agriculturists will speak on forestry, and the whole tone of the meeting will become nicely balanced. I make no apologies, however, because I feel that if foresters had, in the past, thought more in terms of agriculture, and conversely, agriculturists taken the broader view, many of our land use problems would not be with us today.

But let us now discuss forestry.

In your provincial Forest Inventory Report of 1961, one may note that the Grande Prairie, Peace River, Slave Lake and Lac la Biche Forest Districts contain a total of approximately 28.5 million acres of presently forested land. Whether these Districts fit exactly to your definition of Northern Alberta, I cannot say. I believe the jurisdiction of your Development Council goes south to the 55th parallel of latitude, whereas in my choice of districts I may have gone slightly further South. At any rate, I do not think this imaginary parallel will invalidate the remarks I wish to make.

On these 28.5 million acres of forest, annual forest production totalled 37.7 million cubic feet over a five-year period. This yield of approximately 1.3 cubic feet per acre per year, is, you will agree, only a small fraction of the potential. An estimate of the potential of this area at some 20 to 25 cubic feet per acre per year is considered as very conservative.

This very crude assessment I have made serves one, and only one purpose, and that is to demonstrate that your northern forest is now being utilized at a very low level.

When people speak of forest management, there is a great tendency to compare Canadian conditions to those on Europe, and to hold European forest practice as the objective to which we should strive. Well and good; but in actual fact, there are few parallels between conditions here and in Europe, and it should be remembered that in almost all of Western Europe, wood is in relatively short supply, while here in Canada we do not utilize much more than one quarter of our growth potential.

Forest management in Canada has developed and will continue to do so by regions, as industry becomes established. For many years much of our northern forest will continue to receive only a modicum of management, and one may or may not have any dispute with this approach.

The fact remains that here, in Northern Alberta, there is a forest potential that is definitely under-utilized but appears to be on the brink of greatly increased exploitation. The interest of major pulp companies is becoming intensive, sawlog operations are expanding into new areas, several plywood industries have become established. The stage, therefore, is set for an improvement of the management regime.

I see several factors which require immediate consideration:—Northern Alberta is an area in which **depletion by fire** exceeds that of cutting. Prior to 1950, your fire losses exceeded one per cent per year. Greatly improved fire protection during the past 15 years has reduced this loss to about one-quarter of one per cent. An acceptable loss, compatible with good management, is considered to be about one-tenth of one per cent per year.

The improvement in Canada in fire detection and suppression techniques during the past 10 years have been spectacular, and it is to the credit of your Department of Lands and Forests that this Province has pioneered many of the newly developed methods. I would classify adequate fire protection as the prime prerequisites of good management in this area.

—Another management factor which must be considered is that of **wood utilization**. Throughout much of Canada, pulp and lumber production are becoming closely integrated. If conditions here in any way resemble those in Eastern Canada, I would willingly speculate that your sawmilling operations utilize not more than 50 per cent of the merchantable volume of a tree. The recovery of wood chips can increase this utilization to at least 80 per cent.

Of course, at this time you do not have a market for wood chips; however, when a pulp industry becomes

established, it should where the economics of transportation permit, be integrated with existing sawmilling. —One other factor is absolutely critical if you are to improve management in this area, and this is **regeneration of your forest stands**. It is recognized that the pine and spruce forests of Western Canada are among the most difficult to regenerate naturally. These two valuable species must therefore become re-established if we are to pay other than lip service to forest management. Scarification, aerial and ground seeding, planting and controlled burning are a few of the techniques which have demonstrated success. The application of these techniques has been made in Alberta to a limited extent, but, I believe, with encouraging results. There are vast areas in this region which have not restocked following fire and/or logging.

Knowledge of forest soils and of their capability, either in their natural condition or as they undergo various lines of evolution as a result of human or catastrophic action, is therefore of direct necessity for proper management of stands, and of indirect impact on utilization.

That the Canada Land Inventory should, henceforth, be regarded as an indispensable instrument for the establishment, improvement and development of sound forest management practices in this country is beyond doubt in my mind.

Its potentialities, though different, are as important for forestry as they are for agriculture; but in either case, they hold the key to a rational husbandry of the two resources.

In closing, I would like to comment briefly on the role of government in regional development. There is little doubt that the regional concept must become an important factor in government planning at all levels. I do not believe that a fourth or regional level of government is likely to be established, but I reiterate that all governments will, of necessity, adapt much of their planning to the regional approach.

The ARDA program is deeply committed to the regional concept. As you know, the federal allocation to ARDA over the next five years is of the order of 175 million dollars. This contribution is significant, but what is even more important is that ARDA is a means of focussing other federal aid on the regional programs being planned and developed by the provinces. The need for coordination is therefore very great, and so is the need for organizations such as yours—one purpose of which is to ensure that overlapping duplication, and contradictory government programs are avoided.



R. H. LAIDMAN

Mr. R. H. "Dick" Laidman has made aviation his career since joining Starratt Airways as an engineer in 1938. He formed his own flying company in the Northwest Territories in 1944, and later operated from Vernon, B.C. until 1950.

Joining Pacific Western Airlines (then known as Central B.C. Airways) in 1951 as chief pilot, Mr. Laidman was promoted to Operations Manager, Assistant General Manager and in 1961 to Vice-President and General Manager. In 1962, he was appointed President and General Manager.

Mr. Laidman is a constant advocate of a modern and up-dated air policy for Canada and his Company demonstrates the local benefits of such a policy in its day-to-day operations.

AIR TRANSPORTATION AND THE NORTH

presented by

R. H. LAIDMAN

President, Pacific Western Airlines Ltd.

THIS conference on northern Alberta Development is the most timely and will, I am sure, draw the attention of industry not only from Canada but from many parts of the world. "The Changing Frontier," — The title you have chosen for this conference is certainly appropriate and I am sure that all of us who have been associated with the past, — and dedicated to the future of our great northland, are pleased to express our thoughts at this time.

As one of the many former bush pilots that flew in the north, I realize that it was this great country that provided me with the opportunity for a start in aviation and a continuing challenge in this interesting field of transport. The topic of my talk, therefore, is "Air Transportation and the North".

I have always been interested in aviation and its contribution to northern development. Some time ago I came across a book called "The Mighty Peace River Country" which is an excellent historical and tourist guide. It was interesting to learn from this book that the town of Peace River, in which we are gathered today, lies within the beautiful "Green Valley Game Preserve", which was named after Dr. William J. Greene. Dr. Greene, I am told, was chiefly responsible for this game preserve being established, and first lived in the Peace River District in 1911. But did you know that he became interested in flying in the year of 1902 and worked with Wilbur Wright, the co-inventor of the first flying machine? He built and flew his own plane in 1909 and served in the United States Air Force in World War I. Dr. Greene is credited with having built and sold 18 airplanes which were among the first aircraft manufactured in the world.

The Wright Brothers' invention of 1903, and the flying machines which have been developed since that time, have been of great importance in the development of many areas throughout the world,—and particularly

in our own north. Transportation and development go hand in hand, and one is dependent on the other.

Today there is 65% of the land mass of the world which cannot be traversed by surface methods, at least it is not economically feasible to do so. However, there is no portion of the land area of the world that cannot be traversed or developed by use of aircraft in its various forms. To go further—and we need imagination today —, there is no other means by which we could have sent man off this earth into orbit, and eventually to the moon, and other planets. Man has already walked in space at speeds of almost 18,000 miles an hour — which prompted our Honorable Minister of Highways in British Columbia to remark on how wonderful it must have been to travel at such speed with no RCMP to worry about.

Getting back to earth—the airplane in its various forms has provided the means for much of the development and establishment that exists in northern Canada today. There are a few isolated spots on the Arctic Coast that were established by ocean going vessels which travelled into Arctic waters, but in each case they have subsequently been serviced by air as a result of the very short season in which boats can navigate in the northern ice fields.

I cannot think of any one development in the past 35 years, in the far north, where the aircraft has not played a significant part. Several undertakings could not even have been considered or warranted without air support. You will recall the staking and development of the Norman Wells oil fields with the use of aircraft back in the late twenties — you will recall Gilbert Labines exploratory forays into the north which ultimately resulted in the production of most of the allied world's radium supply during World War II at Port Radium on Great Bear Lake. Goldfields, Yellowknife, Uranium City, Mildred Lake, Pine Point and

many others are examples of developments that were greatly assisted by air transport.

Inuvik — sometimes referred to as “A Great Canadian Development” and sometimes in more derogatory terms, is, despite all else, a virtual child of the air age. When the decision was taken to relocate and expand some of the facilities of Aklavik, an extensive reconnaissance of the entire Mackenzie Delta was undertaken to locate a suitable site. The site finally selected was chosen because of the large level area well above flood levels, the presence of gravel for construction, its location on a navigable stream and the excellent possibilities for a modern airport and landing strip. Due to the requirement for air transport, the airport development was given first priority with construction starting in 1956 and in use by the same winter.

There must be a “necessity”, or “a public requirement” in the north, as anywhere else, in order to establish commercial air services. In the first place, there must be an incentive of some description to propagate interest in any given area in the north. For example, there are many cases of a prospector, armed with only determination and imagination, travelling into the north by a combination of sea-plane and canoe in search of minerals. Having found a valuable showing he has taken the trouble to record it as a claim, and this action of course develops the interest of many other prospectors who fly into the area to stake adjacent claims. After this activity has been established there is usually development or proving up work to be done and drill crews move in to sample the sub-surface ore. If the assays are not all they hoped for, there is a good possibility that the area may die temporarily. On the other hand, should the samples prove to be interesting and rich in minerals, there is an extremely good chance that a mine will develop,—and subsequently a townsite.

Essentially the same evolution applies to petroleum development with the exception that the final production of petroleum can be automated to a greater extent, therefore not requiring as many townsites for its processes. If a townsite should develop, the “public convenience and necessity” that is a prerequisite for regular air service becomes a fact.

As businessmen we all realize that once a townsite is founded, and development is underway, those working on these projects wish to be joined by their families. These are the kind of people we need to create a stable manpower force and they rightfully demand a few of the amenities of life in these areas of development. They require housing, education for their children, mail services and medical attention when required. Here again the airplane plays an important part as no citizen today is more than a few hours from a modern, well equipped hospital, thanks to air transportation. We all know of many mercy flights that have been performed in the north in times of emergency and disaster and I am sure this has done much to build the peoples confidence in knowing that they are not entirely isolated.

I might say here, that while I am busy trying to show a profit for our Directors and shareholders, — and this is very necessary, the greatest satisfaction I

get out of aviation is what it can do for our country and its people. Recently in northern B.C. one of our small aircraft was on its way to the Peace Power Project on a very important business trip. One of our radio operators in the area received a call advising that a young man had been badly injured in the bush and that unless he could be taken to Vancouver immediately, his leg would have to be amputated. Without question the flight turned back from this important business appointment and had the patient in Vancouver General Hospital in 3½ hours. The man's leg was saved and to me this is real self satisfaction. I believe that as leaders of industry it is our first job to carefully develop our country, its people and our resources and the other rewards will follow. If we deal in short sighted policies of immediate monetary gain we are not fulfilling our responsibilities. We need men of vision to develop our resources which in turn will increase the population and expand and create new markets.

During the past couple of years I have flown a number of trips to various countries overseas. Mind you, I only do this when our flight crews on trans-Atlantic charters are running out of time and so they put me to work,—but after visiting many of these countries and returning home, I marvel over the abundance of natural resources that we have and at how fortunate we really are. Just look at what is around us. Water, power, timber, minerals, agriculture and so many God given assets that we can rightfully be proud of this country. To add to all this, we live in a land of democracy and free enterprise for which we can be most thankful.

As new development takes place in our north and townsites are established there is a responsibility on the air carrier who has been operating in that area. Along with the industry in the area, the air carrier must share in the “all important” vision of the future of that area.

The air carrier must analyze the traffic potentialities and requirements to see if they are sufficient to justify a regular air service. If such is justified, then we must enlist the support of the industry and the people in the area in negotiating with the Federal Government for an airport facility.

In the event that the Federal Government is not in a position to consider an airport facility at the time, the air carrier must assist the development companies in taking the initiative to establish an adequate facility of their own and arrange the subsequent support. (In most cases, the capital cost of establishing an air strip is much less than the maintenance cost for the ensuing eight or ten years.)

In my opinion, each air carrier has an obligation to this country to gear its operations directly to the development status of the area which it serves. Roads and even railroads, may eventually be built, — but in the early stages the airplane is often the only means of public transport. Perhaps the greatest example of airlines staying in step with, and playing a part in, the development of the north are the PWA routes that serve northern Alberta and the Mackenzie River District from Calgary and Edmonton to the Arctic Coast and into Saskatchewan. We hope that the long awaited Govern-

ment Regional Air Policy will be soon forthcoming so we can connect these routes with those we have in British Columbia and extend into the Yukon and other points.

On northern routes our company has in several instances provided larger aircraft, and therefore lower rates, in advance of their economic justification. In almost every case this action has shortly afterwards been supported and we have therefore in effect speeded up the development and made available the amenities of normal living sooner than would otherwise be the case.

Such decisions upset our research department, of course. It is their job to deal in facts and statistics—not in visions and prognostications.

You have perhaps heard that statistics have been compared to a bikini bathing suit “which tends to stimulate the imagination while obscuring the essential features”. Or, as it was said recently, “statistics are like a drunk leaning against a lamp post—more for support than illumination”.

Research is very important, but pure research must be tempered with intuition, and with sound management judgment based on practical experience.

As I indicated before, there must be an incentive to stimulate activity in any given area. Invariably the first aerial activity is with the smaller aircraft such as the Beaver or Otter and in many of the arid or mountainous regions, with a helicopter. This equipment operates when the weather is fit and when visual contact can be made with the ground at all times, and perform quite adequately through the exploratory and development stages. However, after the development has proven available resources and the production stage is considered, a much longer view can be taken of the overall potential. In order to develop the project, whatever it be in nature, there also becomes a requirement for workers and perhaps ultimately for their families. At this stage, the ton-mile and passenger-mile transportation costs of the smaller and slower flying aircraft make economic production quite prohibitive. Therefore, the proprietor of the development site must look for new methods of transportation for the now required heavy production machinery and supplies, and for transportation of his product out to market. In some cases, it has been possible and economically feasible to build roads to the property for this purpose. They may only be winter roads at first and then, at a later date, all-weather roads. In some cases where substantial long-term productivity has been established, railroads have been justified where topography would permit. However, in cases such as Yellowknife, Red Lake and many other areas, the distances and topography did not permit the early development of adequate surface methods for reasons of economics. This is not to mean that ultimate methods of surface transport were not,—or should not, be considered.

By way of example of how aircraft have been employed in the development stages of several projects, I would like to tell you that Pacific Western pioneered glacier operations with large multi-engine aircraft. This had never been done anywhere in the world and yet

we presently enjoy a history of having carried fifty-one hundred and eighty tons onto the Leduc glacier, in the Coast mountains of British Columbia, for Granduc Mines. We carried in excess of one hundred tons with large aircraft into an adequate, but nevertheless quickly prepared, strip at the Snake River iron ore property of Crest Explorations and carried out the ore samples on which presumably the “go” or “no go” decision will be made. Under almost exactly the same conditions, we carried more than five hundred tons of trucks and heavy mining equipment from Watson Lake into the Canada Tungsten mining property.

We are presently hauling fuel oil, no doubt produced somewhere else in Alberta, into the Rainbow Lake area so that they can put their machinery to work to develop oil production; and we completed many, many trips into Mildred Lake as an extension of our Fort McMurray service, to serve the Tar Sands Project prior to the road development from Fort McMurray. These are just a few of the major development projects that we have participated in, in the western part of the country, and we have worked with many others. I mention these specifically because they were done with large aircraft at costs that could not be approached by smaller aircraft, — but that necessitated the cooperative planning and construction of suitable landing areas for the large aircraft. (As a matter of interest—there was no Government financial aid in any of these cases.) These operations involved development of new operating techniques,—and the net result in all cases was lower “total cost” than by any other method.

Now, — when substantial long-term development appears imminent, there becomes sufficient justification for the air carrier in the area to consider the creation of a substantially more expensive establishment, both in facilities and by the acquisition of additional aircraft if necessary, in order that the lower ton-mile and passenger-mile costs brought about by larger and faster aircraft may be made available.

In northern development, the air carrier has to be prepared to accept types of air strips that do not always compare with the facilities at Peace River, Fort McMurray or Edmonton. As a result, our flight crews must be specially trained in order to make the best possible use of facilities available.

Another good example of flexibility in operations, is our performance on what we refer to as the Annual Spring Arctic Airlift. Three years ago, we convinced the interested people in the village of Coppermine, Northwest Territories, that we could develop a landing strip on the sea ice adjacent to their village and air-freight their supplies in DC-4 aircraft at a rate that was competitive with surface transport. It is fair to say that they were a bit skeptical of our wild-eyed suggestion, but in any case, they offered us approximately 65 tons. This was hardly economic, considering the cost of developing the strip on the sea ice, but we went along with it. The airlift went off very well and the following year there were 180 tons. This last spring, the airlift exceeded 500 tons — to five communities — which included a school house and two residences for Holman Island where still another air strip had been prepared on the sea ice.

Air lines operating only between the principal cities of the world are relieved of the task of searching for ingenious uses for aircraft. However, this is our life and we intend to continue to develop new and better uses for flying equipment in the interests of northern development.

I don't want to indicate that the only development in the north was created by petroleum and minerals, since both agriculture and lumber also play a large part. With the completion of the new air strip at Fort Chipweyan, it is likely that they will justify and enjoy regular air services very soon. There is likely to be an improved air strip at Habay on Hay Lake—which incidentally will completely foul up my favorite goose hunting area. However, such is the price of progress. These air strips will be capable of handling DC-3 equipment and there are presently under construction additional air strips at the towns of High Level, Vermilion, Wabasca and Slave Lake. I am told that the total amount expended by the Northern Alberta Development Council on airport construction and development this year is approximately \$840,000.

At the present time, the majority of air services provided in the north are scheduled mainline services. In a complementary way these services feed into the points from which the development or small aircraft charter services, are operated. In comparison with large inter-city services, northern operations of mainline services provide some interesting challenges in communications, airports, weather, and the nature of the goods to be moved.

Normally speaking in scheduled air transportation, the accepted order of shipping priority is: mail, passengers, air express and air freight. An air line in the north may not always adhere to this universally accepted priority system, however. For example, our payload control office frequently runs into the situation where there may be 40 people requesting travel space between Edmonton and one of the extreme northern points, which is only served by air transportation. At the same time, we may have in our warehouse, several perishable shipments destined to exactly the same point. We have learned by experience that there must be a relative ratio of food to people at these points—something taken for granted in our part of the country. Therefore, we would not normally sell all the passenger seats available but would make up the balance of the load with the high priority merchandise. There is also the case of having a "stop sales" on passenger seats in order to carry machinery parts or complete machine assemblies to some of the remote northern cities, where perhaps 50 or 60 people may be idle as a result of a mechanical breakdown. No doubt, many of you have often wondered why there are empty seats when you have had difficulty in getting one; and I would hope the foregoing remarks have explained our problem.

Selection of flying equipment is perhaps one of the heaviest decisions that an air carrier has to make. There are a great many ramifications which must be considered in selecting new and expensive flying equipment, particularly on mainline services. Charter or development operations pretty well establish the type of equipment to be used by the nature of goods to be

carried and the air strip available. On northern mainline services, the carrier must recognize that where the population density is higher, the area is usually serviced by competitive surface carrier. In areas where the population density is low, the volume of traffic is most often related. In order to provide the lowest ton-mile costs to the customer, the tendency is to move to larger and faster aircraft. This, of course, provides too much capacity if you offer excessive frequency of service, so again scheduling becomes a compromise between price and frequency.

Pacific Western has for some time been deeply involved in detailed studies of turbo-prop aircraft to replace our DC-3 equipment and is presently studying all of the intricate details of DC-6 replacement with pure Jet Douglas DC-9 or Boeing 737 equipment. Replacement equipment for the north would of necessity be combination cargo and passenger aircraft readily convertible to an all passenger configuration—or an all freight configuration. These aircraft sell at a price in excess of three million dollars each, but we seriously believe that it will be necessary in the future to employ this modern technology in the interests of both the public and the carriers.

I must, however, be very emphatic when I state that the air carriers serving northern communities must stretch the capability of sophisticated aircraft and crews to the maximum limit of good judgment, and in many cases beyond economic limits, by serving many points of call with inadequate airport facilities, particularly runways. DC-6 equipment was never designed for sand, gravel or dirt runway operations, but we have developed techniques that have permitted us to make such modern equipment available to the northern travellers without compromising in any way the safety of the operation. Pure Jet aircraft can not, and will not, operate on these types of airports. If northern development and improved service is important, and we submit it is, airports like Hay River, Fort Simpson, Norman Wells, Inuvik and Dawson Creek must be brought up to standards useable by such aircraft. While the cost to benefit ratio is so often used as an index of Government decision on spending, I believe it is entirely the wrong method of measuring necessary expenditures in the north.

Perhaps one of the best examples of how modern technology in air transportation can assist the north is evident in the Mackenzie River valley. For many years the Mackenzie area was served by single engined sea planes in summer, and ski-planes in winter, with small loads and high costs. It then graduated to DC-3 equipment carrying approximately 5,000 lbs. and later to C-46 equipment carrying 11 thousand lbs. When we took over the C-46 operation from our predecessor in 1959, we inherited the same operating schedule and accordingly it involved two C-46 flights per week down river to Inuvik. At that time the freight rate was 62c per lb. Today we run three and sometimes four DC-6B trips, carrying 24 thousand lbs. each, roughly four times the capacity per week, to Inuvik through Fort Smith and Norman Wells. We also operate two C-46's as far down the Mackenzie River as Wrigley. Most of the freight we haul to Norman Wells and Inuvik is now at a 25c lb. rate as compared with 62c in 1959.

We submit that this is a product of technological progress, and that it permits greater development possibilities in the north.

I have spoken a great deal of mainline and charter services with large aircraft but I must also mention that this supports a very large fleet of smaller bush type aircraft operated in the north by many carriers—including Pacific Western.

There are many other uses for air transportation, that have not been touched on here. The Government of Alberta is a very large consumer of air transportation in the field of forest fire suppression, which is designed to insure the continued availability of a tremendous natural resource in northern Alberta timber.

Since Peace River is one of the predominant agricultural districts of the world, I should say that the use of aircraft plays a very large part in this field of endeavor also. Aerial weed and pest control improve crops materially. In Australia miles of arid non-productive country have been turned into very rich farm lands by aerial fertilizing under government sponsorship. In many parts of the world, they have been successful in developing forced rainfall by the seeding of clouds with silver oxide. Aerial crop seeding has been accomplished in a great number of areas with varying levels of success; and we all know that some ploughing and threshing have been done by unfortunate pilots, including myself, while executing a forced landing in some farmer's prize wheat crop.

In the areas of northern Alberta, and the Territories to the north and west, another great market will develop in a very few short years. Here I speak of the tourist trade. Our Sales Department tells us from their surveys that there is a great demand from people who are eager to visit this country. This demand is not only from other parts of Canada, but particularly from the United States, the United Kingdom, Western Europe and—believe it or not—from the Orient. Our Vice-President of Sales, who has travelled in these countries in connection with our International charter flights, advises me that a tremendous market is available if accommodations in the north were available for tourist trade.

Here then is an opportunity for those who can invest and provide adequate facilities for tourists. Hunting, fishing, boating and outdoor life in Canada's north-land can be a real attraction and one that we are promoting now. The tourist trade is a terrific industry, the third largest in Canada and we welcome the opportunity to fly these people into this frontier.

On the other hand we feel that the people in the north are entitled to a couple of weeks' holiday in the sun during the cold winter and after a hard summer's

work. These holidays in the sun however must be within the reach of the working man. In an endeavour to make this possible, our company has planned and operated the first all-inclusive tour trips operated out of Canada. In conjunction with Elgin Hotels of the West Indies, we have completed two successful seasons of inclusive tour operations to the island of Grand Cayman in the British West Indies. The Air Transport Board of Canada gave us permission to do these inclusive Tours on a trial basis for the past two seasons and we are eagerly awaiting a licence to perform more of these types of operations this year.

The inclusive tour includes air fare, rooms, some meals, sightseeing and almost everything down to tips, and are priced so that they are available to the working man. This we feel makes a holiday available to greater numbers, increases travel and creates a whole new market. We have applied to operate inclusive tours from Alberta this year and feel that our Federal Government should make these low-cost trips available to Alberta and the people of the north—all such opportunities add to the activities of the north in its development and makes "The Changing Frontier" a better place to live.

Now ladies and gentlemen, while I could go on at some length with this subject of "Air Transportation and the North", I think I have given you sufficient of my thoughts on the subject. I know you have a full agenda for the rest of the afternoon.

In closing I would like to leave a few thoughts and suggestions with you.

1. The high cost of transportation in any of its forms, is a deterrent to Northern development. To further lower costs of air transport we need improved airports and facilities to take advantage of the more modern and efficient aircraft which can offer lower rates.
2. It is important to every Canadian that the Government of Canada be urged to establish the long awaited Regional Air Policy which would give added route mileage and "Economy of Size" to these operations — thereby making it possible to spread costs over a greater area and provide still lower rates.
3. We should all study ways and means to encourage the tourist trade and to attract investors to establish facilities for tourists.
4. And in doing these things we would do well to keep in mind the words of the late John F. Kennedy and apply them to our north—Let us not ask "What can my country do for me — but rather, what can I do for my country".

You can all be assured that we in the air transportation industry will continue to do our part.



DEAN C. F. BENTLEY

A specialist in Soil Science, Dr. Bentley's entire career has been devoted to instructing and teaching in the field of Agriculture, in Alberta, Saskatchewan, and Minnesota. He was appointed Dean of Agriculture at the University of Alberta in 1959, and has served as Colombo Plan specialist in Ceylon, and consultant in Thailand. He received the Minnesota Outstanding Achievement Award in 1961, and served as president of the Agricultural Institute of Canada from 1962 to 1964.

PRESENT AND FUTURE AGRICULTURE PRODUCTION IN ALBERTA'S PEACE RIVER AREA*

presented by

C. F. BENTLEY
University of Alberta

THE title under which I am to speak, calls not only for a review of the current agriculture production of this area, but it also entails predictions of future patterns of agricultural development here. Predictions are difficult in any field. But in Agriculture predictions are particularly difficult, because not only are there the usual economic uncertainties to affect the course of future events, but there are also the hazards of uncertain weather and the real possibility that changes in Government policy whether at the Provincial or Federal levels, may have important effects on the nature of agricultural developments and changes:

Domestic Factors And Development

Here in the Peace River District, the domestic factors which can affect the course of future agricultural developments include not only the general state of the Canadian economy and the rate of Canadian population growth, but as well local economic developments which may or may not take place. If an ore extracting industry were to develop here it could have very great effects on the agricultural prospects for this area. The possibility of new or changed government policies substantially affecting the course of agricultural development here, should not be overlooked. For example, if the current policy of providing subsidized credit for the purchase of land were discontinued and if it were to be replaced by a government policy to offer subsidized credit for the purchase of fertilizer instead the effects on land development in this area could be very important. The present Canadian Feed Grain Policy is being attacked in some quarters and this may lead to

changes which could also have implications for the Peace River Area. Finally, government policy decisions are involved in deciding whether to encourage or assist the development and clearing of new lands in an area such as the Peace River, in preference to similar policies for the expansion of irrigation in some other part of the Province.

Agriculture is probably the most competitive industry there is: every area is in competition with other areas. During the last five years, Canada's exports of feed grains to Europe have been approximately steady in spite of sharply increased imports there. The big demand is for corn, and Alberta-produced feed grains are having difficulty competing with corn in Canada, let alone in Europe. In fact, scientific advances in other areas within and outside of Canada are posing serious problems of competition for Alberta grains: corn production in Ontario is increasing in spectacular fashion; during the last 15 years Mexican wheat yields have increased from 11 bushels per acre to about 40 bushels per acre—and Mexico is now an exporter rather than an importer of wheat.

External Factors and Development

Foreign events may also have most important implications for the development of agriculture in the Peace River Region. Currently the Kennedy Round of trade negotiations are largely stalled because of problems concerning the policies to be developed regarding trade in agricultural commodities. The French Government is making a determined effort to win tariff protection for French wheat in the Common Market area.

*As used in this paper "Peace River Area", "Peace River Region", "Crop District 7", "Peace River District" etc., are used interchangeably and refer only to the Alberta part of the region unless it is specifically stated that the British Columbia portion is also included.

If France succeeds in winning such a concession Canada is in prospect of losing an important part of what has been a traditional market for Canadian wheat in Western Europe. There is no way by which we can foretell how often or how consistent will be the opportunities for Canada to make huge sales of wheat, such as the one of 1963 and 1965 to Russia as well as the others of recent years to China. Attempting to predict those and similar markets is as hazardous as trying to predict Alberta weather. Similarly, we are unable to predict other areas where either by virtue of unexpected economic progress, or unanticipated adverse agricultural conditions, we may find new buyers for Canadian wheat. It can scarcely be over emphasized that these external factors can have important effects on the future development of Agriculture in the Peace River country, because we must not lose sight of the fact that approximately 80% of Canadian wheat production is exported and approximately 75% of Canada's rape seed has been exported in recent years.

Consequential increases in agricultural exports will be hard won: they will be earned by consistent supply of **what the customer wants** in intensely competitive international and Eastern Canadian markets. This area has an advantage over most competitors because of large scale highly mechanized operations on low cost land. However the Economic Council of Canada has estimated that Canada's agricultural exports will increase at only 1.5% per year during the next 5 years. So far the Council hasn't ventured predictions beyond 1970.

With all of that qualifying background, let us now proceed with the subject matter covered by the title.

Some Alberta and Peace River Data

Let us first look at the Agriculture production of the Peace River Area according to statistics. Table 1 shows this area to have about 10% of Alberta's improved land and 12% of the province's farmers. Table 2 presents data concerning the principal field crops for Alberta and in the Peace River Region, averaged for the years 1962 and 1963 to reduce yearly variations. Several items there merit special note. For the two years concerned yields in the Peace Area averaged lower than for the rest of the province. While those yields reflect the poor crops of 1963 it is probable, if there is any difference, that yield variations in this area are more violent than they are for Alberta as a whole. Table 2 shows that barley, tame hay, rape and flax are crops with acreages and production above relative provincial averages. Table 3 presents data for the year 1961 for forage crops grown for seed production and indicates the approximate percent of Canadian production of those seed crops produced here in the Peace River Area. Forage seed production is the real agricultural specialization of this district. But note that all forage crops, including those grown for hay and pasture as well as those for seed production, occupy only about 17% of the improved land in the Peace River Area.

Livestock data for the area are presented in Table 4. Obviously in relation to the proportion of

farmers and amount of improved land in the province, Peace River District livestock production is at only about 50 percent of the provincial average.

Recommended Land Use

Tables 1, 2, 3 and 4 show land use and farm production of the Peace River Area as it is. The Beaverlodge Research Station has done agricultural research in this area for about half a century and the findings of the Station provide the most reliable and authoritative information regarding agriculture here. In 1960 Mr. E. C. Stacey, then Superintendent of the Beaverlodge Station, proposed that if recommended land use and cropping practices were to be followed on the Upper Peace River Region land under cultivation (including that in the B.C. block) then land use of 1960 would have required adjustments as follows:

Wheat acreage	— 25%
Oats acreage	— 18%
Barley acreage	— 8%
Fallow acreage	— 28%
Forage crops acreage	+ 95%

Thus Mr. Stacey's recommended land use for the Upper Peace River Region called for a reduction in the percentage of the improved land seeded to grains, especially wheat, a reduction in the percent of land being fallowed and an approximate doubling of the proportion of land in forage crops. The most recent information available indicates that the percent of land fallowed in the Peace River District is still on the order of 20% of the improved land, which is far above the 10 to 15% which Mr. Stacey proposed as being desirable if best land use practices were to be followed. Because only a small part of the increase acreage of forage crops recommended could be devoted to seed production almost all of the additional forage crops production proposed would have to be marketed through livestock. In essence Mr. Stacey's recommendation, based on the Beaverlodge Station work, was: . . . less grain farming and fallowing; . . . and a major increase in livestock production.

Potential Agricultural Land Not Yet Developed

The foregoing constitutes a summary of present land use and agricultural production in the Peace River District. Now let us look at prospects for future agricultural production of this area. To do that it is desirable to first consider the potential but undeveloped agricultural land here. Tables 5 and 6 present data which show that most of Alberta's potentially arable land is in the Peace River Area. With present state of Canadian agricultural science this constitutes about one third of Canada's potentially arable land. **But that statement by itself paints far too rosy a picture.**

A substantial proportion of the improved land in the Peace River District is below the quality of most improved land in the rest of Alberta. Tables 5 and 6 show that almost all of the potential arable land not yet developed in Northern Alberta is Grey Wooded and it has been stated: *"Most of the potentially arable land is generally inferior to much of the land that is presently cultivated";—and "In the immediate future

*Alberta's Land Resources. Agric. Inst. Review. Nov. 1959.

possibly the greatest potential lies in better utilization of areas at present under cultivation”.

To earn average farm incomes while on land of lower than average quality requires one or more of: superior farming techniques; larger than average amounts of capital; harder work.

It is also essential to consider the need for and wisdom of developing potentially arable land in relation to other alternatives. For example soil scientists at the University of Saskatchewan** have estimated that the wheat production of that province could easily be increased by 45% if farmers there were to make more adequate use of existing knowledge regarding such factors of crop production as fertilizer use, moisture conservation, and soil management, together with practical controls for crop diseases, insects and weeds. Market conditions encouraging expanded production in the Peace River Area will also constitute incentives for farmers in other parts of the Prairie Provinces to increase their production of the same crops.

Recent Land Development

The foregoing notwithstanding, land development has been proceeding apace in this area especially during the last two or three years. But there is some uncertainty regarding the amount of land which has been cleared and broken in the Peace River Area in recent years. The Beaverlodge Station in its 1964 “Research Highlights” stated:

“There are now approximately 3.5 million acres of land cultivated in the Upper and Lower Peace River Regions of Alberta and B.C. There are 13 million acres that can be broken and cropped and a further 10 million acres that can be used for pasture production. An estimated 250,000 acres of new land are being put into production in the Peace River Region each year and the rate of development is increasing.”

Mr. Harvey’s report,† which refers to only the Central Peace River District in Alberta, states 264,000 acres were brought under cultivation in the five year period 1956-61. Canadian Wheat Board data‡ show an average increase of 100,000 acres of cultivated land in Crop District 7 in each of the three years 1961 to 1964.

For a round figure, including this year’s breaking, there are about 2.5 million acres of improved land in Alberta’s Peace River District. If land breaking continues at the rate of approximately 100,000 acres per year to 1980 there would then be 4.0 million acres of land under cultivation here.

Three Questions

It has been estimated§ that by 1980 population of the Peace River Area may be about 100,000 . . . unless there is a sharp influx of people due to industrial development. Since the proportion of the labor force doing farm work in the Peace River District (about 40%) is twice the percentage for Alberta, and four

times that of Canada as a whole, continued development of Agriculture will be primarily dependent on exports from the area. Therefore in trying to foresee probable directions of agricultural change and development for this area it is necessary to consider three questions.

1. What can be produced? . . . in reliable quantity and with the quality which export markets demand.
 2. What advantages does the area have?
 3. What are the disadvantages of the region?
- Let us consider those questions in turn.

Advantages and Disadvantages of the Area

We know that the area is well suited to forage production (for seed, hay and pasture) grains, flax and rape seed. Vegetable production along the river from Peace River to Dunvegan is reasonably practical. Livestock production lags behind that of the province as a whole. **During the next decade or two, I do not expect any large scale production of a new crop or crops not now produced in the area.**

I think there are three advantages which this area has:

- The long hours of sunlight not only enable maturing of crops but, in addition, favor the physiological processes involved in seed production for some forage crops; it is not coincidence that so much forage seed is produced here.

- There is an abundance of undeveloped arable land reasonably close to existing means of transportation and communication. This is conducive to large scale efficient mechanized field operations of all kinds.

- The district is the gateway to the north and north west and has access to Vancouver and shipping facilities there for products not shipped to Edmonton.

Unfortunately there are some disadvantages for agriculture here:

- On the average, climate, from the agricultural point of view, is probably more variable here than for the province as a whole.

- For livestock production, the feeding season is somewhat longer than in most of the rest of the province.

- Because of distance from sources of supply and from markets, freight increases cost of most purchases and reduces the price obtained for products which are exported.

- The intensification of agricultural production now taking place generally is more difficult here because of the high costs of whatever farmers buy.

What then are the products this region is best able to produce and sell on export markets?

Forage seeds. There is a natural advantage, a steady and increasing market. This is a specialized type of agriculture requiring superior farming techni-

**Saskatchewan’s Land Resources. W. L. Hutcheon, J. S. Clayton and D. A. Rennie, University of Saskatchewan, 1964.

†Economic Report on Alberta’s Peace River Country 1965.

‡Personal communication from R. E. English.

§Economic Report on Alberta’s Peace River Country 1965.

ques and guidance from agrologists with very high qualifications. Steady supply in quantity and unwavering excellent quality are essential to retain continuing export markets.¹

Current area devoted to forage seed production is less than 10 per cent of the cultivated land. While newly broken land has advantages for production of some seed crops, the markets for forage seeds are not likely to spur much land development.

Flax and rape seed. The demand for flax has been comparatively steady; rape seed production has been increasing very rapidly and because this year's planting of rape was about double last year's, there is concern in some quarters about our ability to sell the 1965 crop at favorable prices. Three quarters of our rape production has been exported, with two thirds going to Japan. Canadian research, especially that done at the Universities of Alberta and Saskatchewan, has made very important contributions to the processing and utilization of rape seed meal. As a consequence, a two man team consisting of a scientist from each of the Universities was sent to Japan last spring to provide technical advice and do education work with respect to processing and utilization of rape seed there. That trade mission may have important effects on expansion of the Japanese market for Canadian rape; only time will tell.

New varieties, better knowledge of fertility requirements and more experienced growers should all contribute to these two oil seed crops being of continuing or expanding importance here. However, they are now grown on less than 10 per cent of the cultivated acreage, and they are therefore unlikely to occupy more than a few hundreds of thousands of acres during the next couple of decades.

Livestock. The Gordon Royal Commission on Canada's Economic Prospects forecast a rapid rise in Canadian income as well as population with, as a result, a higher per capita consumption of livestock products and in total a large increase in the demand for them, especially demand for beef. McFarlane and Black, in a Macdonald College report of 1958, forecast that between 1955 and 1970 Canadian consumption of beef would increase 50 per cent. So far those forecasts have been correct. Markets for livestock look good, and export of high value products of this type helps minimize the high transport costs from this area.

However cattle prices in Canada are very closely linked to the U.S. cattle situation. Our prices are generally attractive when we export to the United States. Unfortunately, year to year fluctuations are rather large with considerable effect on prices to our producers. During 1961-63, an average of 20,000 head were exported from the Eastern Prairies to the Mid-western United States; in 1964 we imported about 5,000 head instead; so far in 7 months of 1965 the exports have been 43,000 head. Successful producers must stay with the livestock business in order to iron

out the effects of such fluctuations and the accompanying price changes.

Recommended land use for this area calls for a substantial expansion of its livestock industry. Fortunately, that recommendation is in tune with demand prospects.

Grains. Wheat, oats and barley collectively probably account for about half the value of all agricultural production in the area. Until there is a great expansion of the livestock industry here, most of the production of these crops will need to be exported. Production here will be in competition with other Canadian, as well as American production, including corn. In that competition, the grain production of the Peace River District has the disadvantage of being farthest from the market—almost regardless of where the market is.

Canada's ability to sell wheat and barley, Canada's second most important grain export, is very dependent on United States support price policies and that country's surplus disposal programs. In 1965, Secretary of Agriculture Freeman endeavored to get the U.S. support price for wheat increased from 75c per bushel to \$1.25. If he had succeeded, there would have been strong incentives for farmers to produce more wheat—and eventually disposal programs, with implications for Canada, would have followed. Canada's sale of 187 million bushels of wheat to Russia in 1965 might not have been made if the United States had repealed the existing requirement that at least half of the U.S. exports to Russia must be transported in U.S. ships—thereby sharply increasing the cost (if not the price!).

Vegetables? No! Vegetable production along the Peace River from that town to Dunvegan is known to be reasonably good. However, I personally doubt that vegetable production will be of much real consequence in the Peace River district in this century. Fewer than 20,000 acres (less than one percent of the present improved land of this area) could supply the vegetable needs of 1 million people. I doubt that vegetables produced in the Peace River Valley can be marketed in Edmonton in competition with vegetables produced at Brooks under irrigation. I can't see vegetable processing industries investing large amounts of capital here when plants could be located in irrigated districts which are much closer to markets and where there are climatic advantages.

Modern large scale vegetable production is intensely technical, and it requires huge amounts of capital as well as of stoop labour. I doubt that it can be successful unless it is near large markets.

CONCLUSION

My foregoing remarks regarding large scale vegetable production should not be construed to in any way constitute discouragement of vegetable production in the Peace River area. I do not think that a vegetable producing industry will ever be on a scale that a consequential amount of the improved land in the Peace River country will be involved, and therefore, I very

¹The development of Aurora Alsike clover has been an important one, made in response to market demands. Foresight and competent leadership will be essential to retain markets and win new ones in the highly competitive market for forage seeds.

much doubt that vegetable production will develop on a scale which will require the establishment of processing plants for frozen, tinned or dehydrated vegetables, with a view to exporting the products to the larger centres of population in Western Canada. Clearly, there is a good opportunity for the production of much or most of the vegetable needs of the Peace River district, some of the needs for the north, and possibly, some export on a seasonal basis to possibly Edmonton or Vancouver. Some very specialized vegetable or small fruit production in the Peace River area may find a good export market, but the acreage of land to be so employed will be exceedingly small in relation to the improved land area of the Peace River region.

Agriculture is, and for many years will continue to be, the most important industry of the Peace River District. Over 75% of the area's production is exported. While the Peace River region is the gateway to the north and northwest, population in those areas is rather low and therefore most of the surplus agricultural production of this area must be exported to Edmonton or Vancouver.

The Peace River District has a tremendous undeveloped area suitable for agricultural production. As I see it, the rate of agricultural development is going to depend on the ability to find markets at prices which will encourage expansion. Perhaps Dr. Purnell foresees the markets upon which I think expansion of agriculture here will depend.

TABLE 1.
NUMBER OF FARMS, AND IMPROVED LAND
STATISTICS, FOR ALBERTA AND
CROP DISTRICT 7
(ALBERTA'S PEACE RIVER DISTRICT).

NUMBER OF FARMS (1961 Census)		% of Total
Alberta	73,212	
Crop District 7	8,955	12
1964 DATA FOR IMPROVED LAND*		
Total Acreage of Field Crops (includes tame hay and pasture)		approx. millions of acres
Alberta	-----	17.4
Crop District 7	-----	1.9
Summerfallow		
Alberta	-----	5.9
Crop District 7	-----	0.44
Improved (total field crops plus summerfallow)		
Alberta	-----	23.3
Crop District 7	-----	2.3
Percent of Total Cultivated Being 'fallowed		
Alberta	-----	23%
Crop District 7	-----	19%

*From Alberta Department of Agriculture Farm Economics Branch.

TABLE 2.
PRINCIPAL FIELD CROPS, ALBERTA AND CROP DISTRICT 7
(ALBERTA'S PEACE RIVER DISTRICT)
1962 & 1963 AVERAGED TO REDUCE YEARLY VARIATIONS.*

	AREA		PRODUCTION		
	'000 acres	% of Alberta	'000,000 bus.	% of Alberta	yield/ac. 1963 as % of 1962
Wheat					%
Alberta	5,870		130.0		130
Crop Dist. 7	426	7.3	7.8	6.0	41
Oats					
Alberta	2,525		123.5		110
Crop Dist. 7	235	9.3	8.8	7.1	55
Barley					
Alberta	3,123		104.0		110
Crop Dist. 7	532	17.0	12.0	11.0	46
Flax **					
Alberta	301		3.35		122
Crop Dist. 7	88	29.0	.69	21.0	61
Rye					
Alberta	205		3.19		104
Crop Dist. 7	8.5	4.1	.16	5.0	64
Tame Hay			'000 tons		
Alberta	2,595		3900		97
Crop Dist. 7	378	15.0	502	12.0	63
Rape **			'000,000 lbs.		
Alberta	206		155		95
Crop Dist. 7	121	59.0	71	46.0	69

*Data from "Statistics of Agriculture for Alberta", Alberta Department of Agriculture, 1965.

**Estimated 1965 acreages: Flax—91,000 and Rape—445,000 . . . a phenomenal increase in rape acreage. (Personal communication from R. E. English.)

TABLE 3.
FORAGE SEED PRODUCTION OF
ALBERTA'S PEACE RIVER DISTRICT 1961.*

SEED CROP	Production '000,000 lbs.	Farm Value	% of Canadian Production
Creeping Red Fescue	13.4	\$1,611,000	77%
Brome Grass	4.1	250,000	43%
Alfalfa	1.5	306,000	22%
Sweet Clover	2.6	200,000	19%
Alsike Clover	3.8	380,000	36%
Red Clover	1.0	160,000	10%

*Economic Report on Alberta's Peace River Country. Northern Alberta Development Council, 1965.

TABLE 4.
LIVESTOCK DATA FOR ALBERTA
AND CROP DISTRICT 7
(ALBERTA'S PEACE RIVER DISTRICT) 1963.*

	'000 Head	% of Alberta
Cattle on Farms		
Alberta	2,935.0	
Crop District 7	126.2	4.3
Cattle Marketings		
Alberta	864.6	
Crop District 7	32.0	3.7
Hog Carcasses Graded		
Alberta	1,350.5	
Crop District 7	82.6	6.1
Hogs on Farms		
Alberta	1,200.	
Crop District 7	97.	8.1
Sheep & Lambs on Farms		
Alberta	445.	
Crop District 7	16.	3.6
Hens & Chickens on Farms		
Alberta	8,200.	
Crop District 7	445.	5.4
Turkeys on Farms		
Alberta	765.	
Crop District 7	15.	2.0

NOTE: The Markets Information Service, Canada Department of Agriculture have reported that in 1960 cattle marketings for Alberta's Peace River District constituted only 2.2% of the total Alberta cattle marketings.

*Data from "Statistics of Alberta Agriculture", Alberta Department of Agriculture, 1965.

TABLE 5.
CULTIVATED AND POTENTIALLY ARABLE
LAND IN ALBERTA BY ZONAL GROUPINGS.*

SOIL ZONE(S)	Cultivated	Arable	Potentially Arable, Yet to be Developed
	millions of acres		
Brown	3.1	2.5	—0.6
Dark Brown	3.2	5.0	—1.0
Black	3.2	5.0	1.8
Thick Black & Dark Grey	5.0	6.5	1.5
Grey Wooded	4.0	15.0	11.0
TOTALS	24.3	38.0	approx. 12 - 13

*Data from "Soil Zones of Alberta". Research Council of Alberta. 1962.

TABLE 6.
DATA FROM EXPLORATORY SOIL SURVEY DONE BY HELICOPTER
(IN SOME CASES SUPPLEMENTED BY ADDITIONAL GROUND SURVEY).*

AREA	LOCATION	CLASSIFICATION OF LAND			thousands of acres
		ARABLE	DOUBTFUL ARABLE	PASTURE & WOODLAND	
1	Edson - Hinton	231	365	2,798	
2	Athabasca to south of Grande Prairie	2,502	1,538	5,381	
3	Lesser Slave & Calling Lake areas	425	1,535	4,494	
4	McMurray & Southward	53	316	4,172	
5	East of Peace River town to McMurray	773	1,374	5,952	
6	Along B.C. boundary North of Peace River	397	72	4,574	
7	South & East of Ft. Vermilion	1,559	462	4,703	
8	Ft. Vermilion, High Level & Hay Lakes	3,937	601	4,781	
9	West portion along north boundary of Alberta	451	10	8,496	
10	Along westerly edge of Lake Athabasca		258	8,737	
11	McMurray & North along east boundary			11,159	
TOTALS, Millions of Acres		10.3	6.5	65.2	
Percent of total area		12-13%	8%	80%	

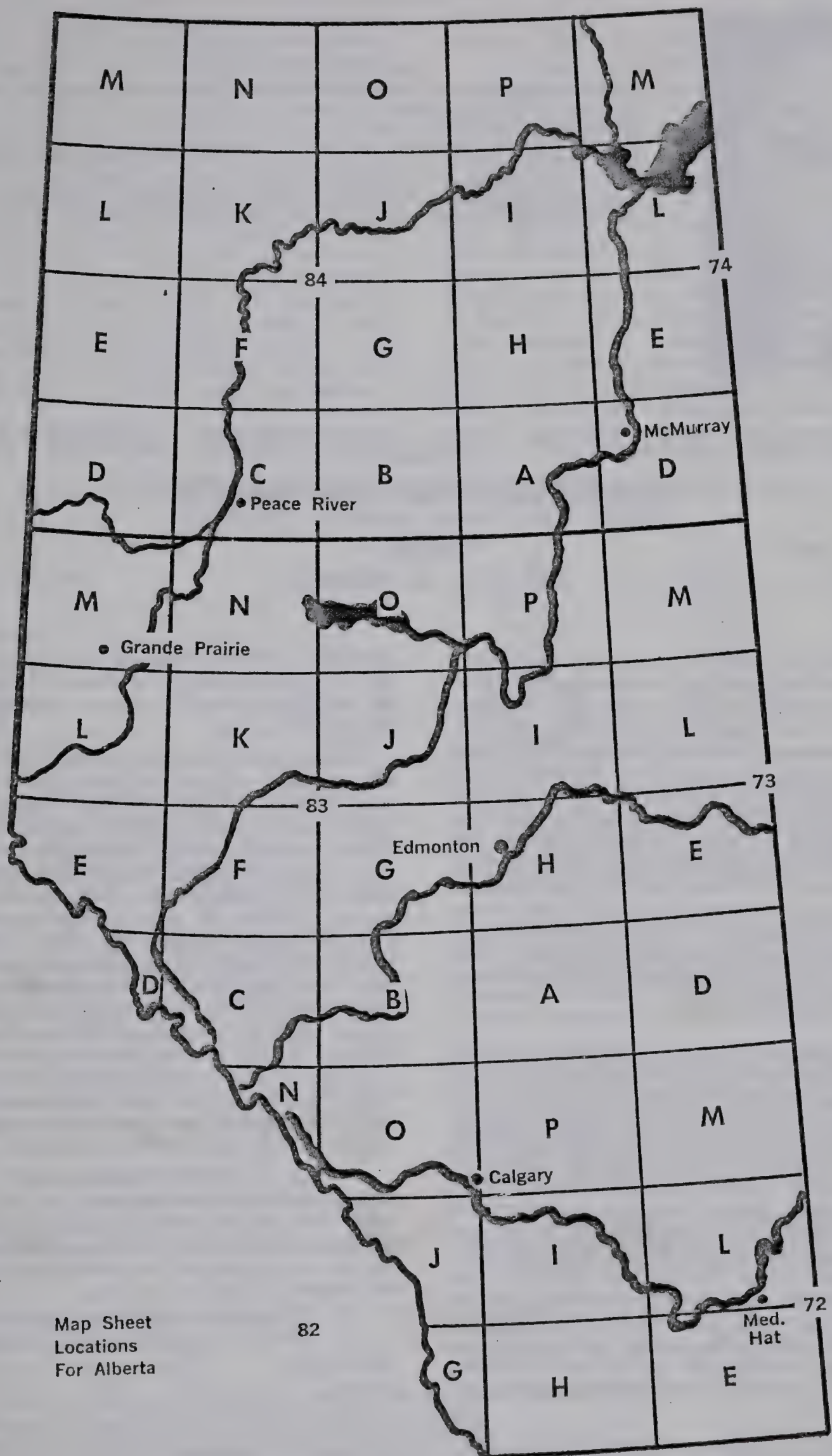
*These data are a summary of the more detailed data of Appendix 1.

APPENDIX 1.
DATA FROM THE EXPLORATORY SOIL SURVEY OF ALBERTA
DONE BY HELICOPTER.*

AREA No.	MAP Nos.**	LOCATION	CLASSIFICATION OF LAND		
			ARABLE	DOUBTFUL ARABLE	PASTURE & WOODLAND
			thousands of acres		
1	83F	Edson - Hinton	231	365	2,798
2	83J	Athabasca to south Grande Prairie	232	581	1,630
	K		1,877	580	957
	L		393	377	2,794
		Sub-Total	2,502	1,538	5,381
3	83O	Lesser Slave & Calling Lake Areas	355	731	2,002
	P		70	804	2,492
		Sub-Total	425	1,535	4,494
4	73M	McMurray & southward		92	3,292
	L(N.½)		53	224	880
		Sub-Total	53	316	4,172
5	84A	East of Peace River town to McMurray			3,280
	B		161	1,098	1,916
	C(E.½)		612	276	756
		Sub-Total	773	1,374	5,952
6	84D(N.½)	Along B.C. boundary N. of Peace River	277	72	1,332
	E		120		3,242
		Sub-Total	397	72	4,574
7	84F	South & east of Ft. Vermilion	1,507	324	1,531
	G		52	138	3,172
		Sub-Total	1,559	462	4,703
8	84J	Fort Vermilion, High Level and Hay Lakes	1,055	253	1,765
	K		2,043	173	919
	L		839	175	2,097
		Sub-Total	3,937	601	4,781
9	84M	West portion along north boundary of Alberta	331	10	2,510
	N		120		2,952
	O				3,034
		Sub-Total	451	10	8,496
10	84H	Along westerly edge of Lake Athabasca			3,168
	I			236	2,650
	P			22	2,919
		Sub-Total		258	8,737
11	74D	McMurray & north along east boundary			3,280
	E				3,132
	L				2,668
	M				2,079
		Sub-Total			11,159
TOTALS			10,328	6,531	65,247

*Data from Research of Alberta Preliminary Soil Survey Reports as follows: 58-1(1957); 59-1(1958); 60-1(1959); 61-1(1960); 62-1(1961); 63-1(1962); 64-1(1963); 64-2(1963).

**See accompanying map for locations of areas.



Map Sheet
Locations
For Alberta



DR. GLEN R. PURNELL

Director of Farm Economics for the Department of Agriculture of Alberta, Dr. Purnell is a native of Cardston, Alberta. He received his education at Cardston, Utah State College, and Montana State College, and obtained his Ph.D. at Iowa State University. Prior to his appointment to the Farm Economics Branch, he was Assistant Professor at the University of Idaho, where he taught agricultural economics, and carried out research on the economics of production and marketing of fresh vegetables and livestock. He has also served as Assistant Secretary of the Oregon Wheat Growers League and as Executive Secretary of the Oregon Soil Conservation Commission.

FUTURE MARKETS FOR NORTHERN ALBERTA'S AGRICULTURAL PRODUCTS^{(1) (2)}

presented by

DR. GLEN R. PURNELL

AGRICULTURAL producers have long since passed the day when they merely tilled the soil and fed their livestock for delivery to the farm gate with the statement, "Here it is—we have produced it, now you market it and the consumer can take it or leave it." Today Alberta farmers must be aware of the slightest changes in the whims or preferences of the housewife. Production must be properly adjusted in quantity, quality, type and combinations if the farmer hopes to tap the flow of dollars arising from consumers of our food and fiber. Millions of dollars have been spent by food merchandising firms to analyze consumer demand and preference patterns. Psychologists, economists, sociologists and other specialists have been called upon to do "market research" in order to guide the marketing firms in the most profitable path.

Retail outlets are extremely sensitive to consumer buying habits. However, the more distant links in the marketing chain are less sensitive. This should not be and must not be so. If retailer procurement practices and patterns change the wholesaler, broker, processor and producer should all be prepared to adjust. Of course, there will be a lag in adjustment by individuals within the marketing channel and it is recognized that probably the biggest lag will be exhibited by the producer. This, however, should result more from the biological nature of the commodities produced and related economics of fixed investments than to the reluctance on the part of a producer to break with tradition. He must meet the market as quickly and economically as possible. We can all recall hearing of Henry Ford's motto: "The consumer should and

can have a choice of models as long as it's a Model T and of colors as long as it's black." Compare this with the modern automobile industry with all its variety of models and colors!

Farmers too must be sensitive. If consumers say through their selective purchases that they no longer want a heavy fat cover on their steaks and that they don't want the steaks too big, then immediately we see retailers ordering smaller, less highly finished beef carcasses from the wholesaler and the wholesaler from the packer. The meat packing company in turn directs its buyers to follow the same change in pattern and very soon the feedlot operator may find it difficult to dispose of his larger finished animals at a profit. This chain reaction may occur in a relatively short period of time, or over several years by degrees or in a combination of short and long range. The speed of adjustments becomes slower the farther we move back from the consumer. Nevertheless cattle ranchers have eventually had to quit raising two- and three-year-old steers. Animals nowadays hit the feedlot at 500 to 800 pounds and are finished in 90 to 200 days ready for slaughter.

There is room for improvement in the quality of agricultural products marketed by the Peace River area. This can be well illustrated by comparing the grades of slaughter cattle in Peace River with the grades for the rest of Alberta. In 1963 we have the following breakdown:

Percentage in Each Slaughter Class				
	Choice	Good	Medium	Common
Peace River	37	26	24	13
Alberta	68	20	9	3

¹Prepared by Dr. G. R. Purnell, Alberta Farm Economics Branch, for delivery at Conference on The Changing Frontier, Peace River, Alberta, October 5 and 6, 1965.

²The author expresses appreciation to Roger Keay of the Farm Economics Branch who assisted in the preparation of data and also reviewed the manuscript.

In Alberta 88% of the cattle grade good and choice, while in Peace River only 63% fall in these same grades, the balance of 37% remaining in medium and common compared with 12% in these grades in the Provincial average. Only 53% of all Peace River cattle marketings were slaughter animals, the balance was feeders.

Economics—Production and Marketing

Agriculture in the Peace River must recognize consumer demand problems and adjust with changes in demand for all its commodities wherever in the world the items are marketed. Of course there are two additional major economic factors plus one non-economic item which must be taken into consideration in the present and future production and marketing of agricultural commodities in the Peace River District. These include physical production possibilities, relative economic production and marketing costs, and personal preferences.

Just as Dr. Bentley has found it difficult to analyze future production without dealing to a degree with marketing, I find it necessary to briefly look at production in relation to future markets.

Dr. Bentley has discussed the physical feasibility of producing additional crops and livestock in the Peace River. It is physically possible to bring 250,000 acres of new land into production each year to raise livestock, forage crops, seeds and grains. But it must be **profitable** to bring this new land in or it will not be developed. Profitability of production depends not only upon the yield (tons, bushels, pounds) per acre but upon the **cost** of growing the product plus the cost of placing it on the market. This means that comparative advantage is operative only when you consider costs of production in the Peace River compared with these costs elsewhere. In a study¹ of production costs and returns on oilseeds and wheat conducted by our Branch in 1961-63 we made comparisons of the Peace River with Central Alberta. Results are illustrated in Table I.

TABLE I
RAPESEED AND WHEAT PRODUCTION COSTS AND RETURNS 1961-63*
CENTRAL ALBERTA AND PEACE RIVER

(Per Acre)	Rapeseed		Wheat	
	Central	Peace River	Central	Peace River
Receipts -----	\$ 47.54	\$ 30.41	\$ 59.71	\$ 23.89
Costs of Production -----	20.31	14.46	23.45	15.99
Net Returns -----	27.23	15.95	36.26	7.90
Break-even Point**				
to cover all costs -----	451.3 lbs.	332.5 lbs.	888.2 lbs.	647.4 lbs.
Actual Yields -----	1056 lbs.	698 lbs.	2262 lbs.	963 lbs.
Production Costs/lb. -----	1.92¢	2.07¢	1.04¢	1.66¢

From this table we can note several points:

1. The relationship of rapeseed yield to wheat in pounds was approximately the same in the Peace River as it was in Central Alberta.
2. Central Alberta yields were higher for both rapeseed and wheat.
3. Production costs per acre for rapeseed were higher (by about $\frac{1}{3}$) in Central Alberta than in the Peace River and production costs per acre for wheat were higher by about $\frac{2}{5}$ in Central Alberta than in Peace River.
4. Net returns per acre were higher in Central Alberta than in Peace River.
5. By the same token costs of production **per pound** for rapeseed and wheat were higher in the Peace River.

Conclusions which might be drawn:

1. Production of rapeseed and of wheat is more profitable in Central Alberta.
2. Rapeseed offers a fairly realistic alternative to wheat in both areas.
3. Peace River is more competitive in rapeseed than in wheat. In other words, Peace River has less comparative disadvantage in rapeseed than in wheat.

Of course one must also recognize possible fluctuations in yields, costs and prices in future years. Also in comparing two different areas the transfer charges from each to point of processing and of ultimate consumption must be taken into account.

Comparisons of this kind could also be made with other commodities for which adequate data exist. Unfortunately there are many gaps in the information necessary to make a comprehensive comparison for all products important to the Peace River.

Now if our agricultural producers in this area will take into account changes in worldwide consumer preferences in addition to their own physical and economic production potential there is little doubt that the production and marketing of agricultural items will gradually and profitably expand here.

To get as clear a picture as possible of the present and projected future pattern of our markets we must first take a look at existing production.

Table II provides information on the relative importance of the Peace River in total agricultural production in the Province. Census Division #15

¹Oil Seeds and Wheat, Production Costs and Returns 1961-63, Farm Economics Branch Alberta Department of Agriculture—K. D. Porter and B. J. McBain.

*Rapeseed averages cover 1961-63 and wheat averages cover only 1962-63.

**Rapeseed @ 4.5¢/lb. and wheat @ 2.64¢/lb.

which is mainly the Peace River area, from the viewpoint of agriculture, produces about 6% of the cash farm sales, and ranks 8th in importance in Alberta.

TABLE II
—FARM CASH INCOME BY CENSUS
DIVISIONS ALBERTA, 1960-61

Census Division	Cash Sales	C.D. as % of Province	Rank
	\$	%	
1	23,677,310	5.4	10
2	58,546,140	13.3	1
3	25,302,720	5.8	9
4	15,637,180	3.6	12
5	48,753,560	11.1	2
6	47,684,130	10.9	3
7	31,799,320	7.2	7
8	36,670,750	8.3	6
9	1,171,080	0.3	15
10	46,011,110	10.5	4
11	39,834,490	9.1	5
12	12,163,950	2.8	13
13	22,643,120	5.1	11
14	1,825,870	0.4	14
15	27,323,140	6.2	8
Province	439,043,870	100.0	

Table III gives a bird's eye view of the relative importance of the various agricultural products within the Peace River area. In 1960-61 crops accounted for $\frac{2}{3}$ of total products sold and livestock $\frac{1}{3}$. Wheat, barley and oats alone represented almost $\frac{1}{2}$ of the total while cattle represented $\frac{1}{7}$ and pigs $\frac{1}{10}$.

TABLE III
—VALUE OF AGRICULTURE PRODUCTS SOLD
Census Division 15—Year Ending May 31, 1961

	Value	% of Total
Wheat -----	\$ 6,160,500	22.5
Other Cash Grains ---	6,729,690	24.6
Oilseeds -----	2,299,880	8.4
Hay -----	1,746,970	6.4
Potatoes etc. -----	78,880	.3
Other Receipts ¹ -----	1,101,850	4.0
Other Crops ² -----	31,010	.1
Total Crops -----	18,148,780	66.4
Livestock & Poultry		
Cattle -----	4,091,350	15.0
Pigs -----	3,130,430	11.4
Sheep -----	101,490	.9
Horses -----	58,170	
Hens & Chickens -----	36,220	
Turkeys -----	30,660	
Other Poultry -----	3,040	
Total Livestock & Poultry -----	7,451,360	27.3

Other Products

Dairy Products -----	737,930	3.5
Eggs -----	221,340	
Fur Bearing Animals --	586,850	2.1
Wool -----	14,160	.7
Honey & Beeswax ----	159,430	
Forest Products -----	2,850	
Other -----	440	
	1,723,000	6.3

Total Value of Agricultural Products Sold -- \$27,323,140 100.0

¹P.F.A.A. payments, crop insurance, etc.

²Includes vegetables, small fruits, greenhouse and nursery products.

Future Production

From my own limited observations and by a little economic analysis I see little reason to argue or to differ with the opinion of Dr. Bentley regarding future agricultural production in the Peace River. Economic and institutional uncertainties are extremely difficult if not impossible to predict accurately. The Dean has suggested some increase in forage seeds and oilseeds, but most significant expansion in livestock production. Vegetable production is not expected to expand significantly as a percentage of your total agricultural production. Cereal grains will continue to utilize a large amount of the arable land. However, I am certain that Dean Bentley will agree that here again relative costs of production must be taken into consideration and appropriate comparisons made between the Peace River area and other areas of production.

Present and Future Markets for Principle Products

These markets present and future depend upon income levels and changes, population makeup and growth, relationship of product prices and costs, taste patterns of consumers wherever they might be, and all the other factors which influence these many items. Table IV outlines some of the national trends which are expected in the most significant demand factors. By 1980 Canadian population is expected to increase by 63%, per capita disposable income by 62%, and per capita expenditures on food by 54% over the 1955-58 averages.

We can see by observing Table V that personal preferences (influenced of course by income levels) will be shifting away from cereals, potatoes and other starches (down about 10% by 1980 on a per capita basis) and over to fruits, vegetables and meats (up 15 to 25% by 1980) while dairy product consumption per capita will remain relatively stable.

TABLE IV

—PROJECTED CANADIAN POPULATION, INCOME AND EXPENDITURES, CONSTANT 1949 DOLLARS

Selected Years, 1960-1980

	Unit	1960	Projections ¹			1980	1980 as Proportion of 1955-58 percent
			1965	1970	1975		
Population	millions	17.5	19.5	21.6	24.0	26.6	162.9
Gross National Product	billion dollars	26.9	32.4	40.7	50.3	61.8	264.1
Personal Expenditure on Goods and Services	billion dollars	17.3	21.3	26.9	33.4	41.6	266.7
Personal Disposable Income	billion dollars	18.2	22.6	28.6	35.6	44.1	264.1
Personal Expenditure on Food ²	dollars	4.6	5.5	6.9	8.4	10.19	251.0
Per Capita Disposable Income	dollars	1,039	1,158	1,322	1,484	1,655	162.2
Per Capita Expenditure on Goods & Services	dollars	988	1,091	1,243	1,392	1,561	163.3
Per Capita Expenditure on Food	dollars	260	284	317	348	382	154.0
Food Expenditure as percent of Disposable Income	percent	25.0	24.5	24.0	23.5	23.1	
Food Expenditure as percent of Total Expenditure	percent	26.4	26.0	25.5	25.0	24.5	

¹The aggregate projections for 1960-80 of population, gross national product, disposable income, total expenditure and expenditure on food were taken from the middle estimates prepared for the Royal Commission on Canada's Economic Prospects.

²Retail value.

TABLE V

—ESTIMATES AND PROJECTIONS OF PER CAPITA CONSUMPTION OF FOOD IN CANADA

Selected Periods, 1926 to 1980

	Unit	Ave. 1949 -53	Ave. 1955 -58	Projections			1980 as Proportion	
				1965	1970	1975	1980	of 1955-58
								percent
Disposable Income per capita -----	1949 dollars	929	1,019	1,158	1,322	1,484	1,655	162
			— Pounds	per capita	per annum	—		
Cereals total -----	retail wt.	168	160	157	153	149	145	91
Flour (including rye) -----	retail wt.	151	143	140	136	133	129	91
Potatoes -----	retail wt.	157	150	146	141	136	131	88
Other starches (sugar, syrup, starches) -----	retail wt.	109	108	107	106	104	103	96
Fruits -----	fresh equiv.	153	177	184	193	202	212	120
Vegetables -----	fresh equiv.	134	143	148	154	159	165	116
Oils and fats (butter excl.) -----	retail wt.	27	28	28	28	29	29	104
Dairy Products Total -----	retail wt.	456	453	454	455	456	457	101
Fluid Milk and Cream -----	retail wt.	395	389	389	389	389	389	100
Butter -----	retail wt.	21	20	19	18	16	15	75
Other Products -----	retail wt.	38	44	46	48	50	52	119
Meats Total -----	carcass wt.	131	141	147	155	163	171	122
Beef and Veal -----	" "	64	79	83	88	93	98	125
Pork -----	" "	55	49	51	54	56	58	119
Lamb and Mutton -----	" "	2	3	3	3	3	3	115
Other -----	" "	11	10	10	11	11	11	112
Poultry -----	dressed wt.	23	33	35	37	39	41	125
Eggs -----	retail wt.	31	37	38	39	40	40	109
Total Consumption -----	pounds	1,390	1,430	1,444	1,461	1,478	1,496	105

¹The Royal Commission on Canada's Economic Prospects.

On the other hand, internationally I expect the market for cereals and coarse grains to expand tremendously. World population is expanding at the rate of one million per week and by the year 2000 the present population of three billion will be doubled to six billion according to U.N.-F.A.O. reports. The average income level of these people is expected to be relatively low and hence one seems justified in predicting vastly expanding world markets for cereals and coarse grains which provide calories and nutrition at low costs. Rising incomes and levels of living in some of the European and Asian countries would also suggest increased demand for Canada's cereals and eventually for our livestock products.

Far be it from me to attempt accurate prediction of agricultural production and marketing in the Peace River. In the early 1900's who would have predicted that production of hops (for brewing beer) would shift almost entirely from Wisconsin and other mid-western states to the Pacific Northwest? Or that lettuce production would shift almost entirely from the Great Lakes states to the Southwest? Nevertheless, in the absence of more economic data and studies, and of a crystal ball (i.e. perfect knowledge), we could take a brief concluding look at present and future markets for Peace River agriculture. Market outlets include domestic (Canada) and export (international). In a tabular fashion we see the following:

TABLE VI
PRODUCTION AND DISTRIBUTION OF MAJOR PEACE RIVER AGRICULTURAL CROPS

	Production	Farm Use	Marketings	Present Market		Future Market
	(Millions of Bushels)			Domestic ¹	Export	Estimate of Change in Dom.-Exp. Ratio
				(as % of Production)		
Wheat -----	7.8	.7	7.1	18	82 ¹	Same
Oats -----	8.8	5.3	3.5	97.3	2.7 ²	More Export
Barley -----	12.0	2.8	9.2	81	19 ²	More Export
Rye -----	.2	.1	.1	5		
Flax -----	.7		.7	30	70 ²	Same
Rapeseed -----	1.4		1.4	30	70 ²	More Local

Although total production may change up or down in each of these products, I have indicated in the last column my expectations of the future ratio of domestic/export marketings as compared with the present. A continuation of the existing ratio for wheat and flax is indicated. I base this on the fact that I see little reason for the export market to take a larger percentage of our total production of these items in the future than it does at present. In other words, increasing demands from the world market will be offset by our own population and income growth. With oats and barley (more particularly with oats) I suggest that the world demand for these items as human food will increase more rapidly than the world demand for meat animals which would be reflected in an increase (percentage-wise) in the demand for oats and barley for animal feeds. With rapeseed I suggest that additional domestic population will encourage more local processing and use of rape for oil and for meal.

It is indeed very difficult to make projections of this kind. An example of the complexity of such projections would be the marketing of Idaho potatoes. In 1948 almost 100% of this highly touted agricultural product was sold on the fresh market. Today nearly 50% of Idaho potato production is processed into one form or another.

In livestock marketing from the Peace River about 32,000 head of cattle and 85,000 head of hogs are marketed annually. I suggest that as the transportation system to the Coast is improved and as the West Coast population grows there will definitely be an expanding market for these animals in that area. British Columbia now imports over 200,000 head of cattle and 600,000 head of hogs annually. Even if the

entire current Peace River marketings were sold on the Coast, this would only account for something like 1/6 and not over 1/4 of their cattle and hog imports. In the Peace River area you are consuming only 1/4 of your hogs produced and 2/3 of your cattle. As your livestock expansion will no doubt exceed your human population growth, you must be alert to new and expanding livestock markets. Certainly the fact that Grande Prairie is only about 800 miles by rail from Vancouver compared with southern Alberta which is 650 to 750 rail miles from the Coast, would put you in a fairly competitive marketing position.

Conclusions and Recommendations

In conclusion I suggest that markets for agricultural products from the Peace River will grow with your production. Distance as you know will continue to be an obstacle to economical marketing. However, it could be that the form of the product marketed could be changed significantly before shipping, thus improving your competitive position. Dr. Guitard may tell us something of this. Before closing, however, I would like to make one recommendation.

In view of the interest of the Northern Development Council, other government agencies, private concerns and individuals in the prospects for the future of agriculture in the Peace River, I would strongly urge that more research in production costs (comparative advantages) and markets be carried out in conjunction with the physical research underway in soils, crops and livestock. The results of such research would indeed prove useful in guiding the plans of individuals and groups in a profitable agriculture in this area.

Thank you.

¹Estimated export for Peace River is based on ratio of exports to production for the Prairie Provinces 1960-64.

²Estimated export for Peace River is based on ratio of exports to production for Canada 1960-64.

³Includes farm use.



A. A. GUITARD

Dr. Guitard received Bachelor and Master of Science degrees from the University of Alberta and served in the R.C.A.F. prior to joining the staff of the Research Branch of the Canada Department of Agriculture at Beaverlodge in 1947. Until 1962 he was in charge of cereal crop research in the north. In association with research personnel in Alaska, he was particularly concerned with examining the response of cereal crops to northern environments and establishing the production potential of the north. Advanced studies in the physiology of this response led to a Doctor of Philosophy degree from the University of Nebraska in 1958.

Dr. Guitard was appointed Superintendent of the Experimental Farm at Beaverlodge in 1962, and in 1965 was named Director of the Research Station and of the associated Experimental Farms at Prince George, B.C., Fort Vermilion, Alberta, and Fort Simpson, N.W.T. In this capacity he is responsible for coordinating research in all major areas of agricultural production in northern Alberta and British Columbia and the Northwest Territories.

NORTHERN ALBERTA'S AGRICULTURAL INDUSTRIAL NEEDS

presented by

A. A. GUITARD,

Director, Research Station, Beaverlodge, Alberta

IN discussing northern Alberta's agricultural industrial needs I am presenting to you an impression of an association that is guided not only by certain basic concepts of supply and demand, but also by the experience and attitudes of governments, major industries and of course the basic producer, the farmer. Nonetheless I will base my assessment of the needs for industry primarily on the production potential of the area, realizing that in so doing there will develop certain inconsistencies and errors.

Even so, we cannot forget that the primary production from agriculture and from the industries that must be associated with it, are of no avail if markets do not exist for the products. External markets must receive special consideration, for we do have a tremendously large production potential and it is not conceivable that we will ever have sufficient population to consume locally even a small portion of that which we can produce. Much of our production will continue to be for export as an important and well integrated part of Canada's total agricultural production. Because of this we must not foster the attitude that this is an "inland empire" sufficient unto itself. As much as we may wish to have the increased population associated with industry, and the social conveniences and increases in purchasing power associated with this population, we must realize that ease of communication and transportation reduce the need for the close physical proximity of agriculture and its related industries. Let us in this light consider the need of agriculture in northern Alberta for associated industry.

If we are to base our consideration of the need for industry on production, we must have an estimate of this. First, we must have a production unit. We could use as this unit the some 2.3 million acres presently being cultivated. However, this is not a stable base since a further some 150,000 acres are now being

broken each year and it is unlikely that this rate will remain constant. It is then better that we use for our basic unit one million acres of land and establish for this a number of constants that can be used to estimate production. These constants will apply whether we have in production the present 2 million acres or have fully developed the further 10 million that are thought to be suitable for agriculture.

Further, we must establish for this one-million-acre production unit a pattern of cropping if we are to arrive at an estimate of input and production. We could use the proportion of crops that are now grown, but again, this may not reflect accurately the proportions that will exist in 20 or 30 or 40 years. It is better to use the proportions that we know to be required for maximum production on our predominantly degraded soils but in doing this to realize, that because of personal preference of producers and market requirements, this "ideal" may never be realized.

Based on our knowledge of the soils of northern Alberta, it is our firm belief that not more than 55% should be devoted to growing annual cereal and oilseed crops during a given year. Of the remaining 45%, probably 35 should be used to produce pure stands of grasses or legumes or combinations of the two. The remaining 10% is required for summerfallowing, primarily after breaking out of forage stands, but also in certain select cases for intensive weed control. Thus, on the average, we should have in production each year 90% or 900,000 acres of our 1-million-acre production unit.

Based on the performance of existing varieties, we propose that each year 250,000 acres be devoted to the production of barley both for malting and seed, 150,000 to the production of oats, 50,000 to the production of wheat, 100,000 to the production of flax

and rapeseed, 75,000 to pure stands of grasses for seed production, 75,000 to pure stands of legumes for seed production, and the remaining 200,000 managed in mixed stands primarily for the production of hay. This then is the basic scheme which I wish to use to consider the need for industry. Production is based on a 1-million-acre production unit of which 900,000 acres are cropped each year. The proportion in various crops is based on best land use, rather than the proportions that presently exist. It differs from the present cropping pattern in that approximately one-half of the area now being summerfallowed and three-quarters of the land now being devoted to the production of wheat, is used for the production of forage.

More than just land is required for production and herein lies our first cause for the association of agriculture with industry. Production requires the input of large quantities of human energy, equipment and the petroleum products for its operation, seed, and chemicals. The first three I will ignore for purposes of this discussion since the manpower is still being supplied reasonably efficiently through home industry, and the equipment and petroleum products necessary for operation are being provided by centralized production industries with extensive networks of dealerships.

Let us then first consider in detail the provision of the seed that is required for production. At rates that extend from as low as 1 pound per acre for certain of the grasses, to 2 or 3 bushels per acre for the coarse grains, casual consideration of their processing may leave the impression that here there is not a sufficient volume to support an auxiliary industry. However, to seed 550,000 acres of cereal and oilseed crops requires just over a million bushels of seed each year and for the 350,000 acres of forages there are needed each year 800,000 pounds of seed. There is now sufficient volume to support in the area a number of privately-owned, corporate and government-assisted cooperative seed cleaning plants. As the acreage increases and as the farms diversify and specialize and rely more and more upon services provided by others, the need for this auxiliary industry will increase.

Since our soils are not perfect there is also the need for nutrient supplementation for optimum production. There is a universal need for phosphorus and under intensive production supplementation with nitrogen is required for most crops. Again, the amounts are not large per acre, but when applied to the 1 million acre production unit they total annually approximately 8,000 tons each of N and P_2O_5 . When these tonnages are multiplied by two to four times, depending on formulation, they both become considerable. With our present acreage and below optimum usage the consumption does not justify a fertilizer plant in the area, but most certainly does justify the expansion of centralized facilities for bulk handling which is now in its infancy. Whether or not, with expanded acreage and increased usage, a fertilizer plant may be feasible I cannot foretell. However, we do have the essential ingredients of air, gas and sulfur for the production of nitrogen.

And then too, there is the matter of controlling weeds, insects and plant diseases. Even though the

proportions of crop that we are using would do much to control these, optimum production is not possible without the supplementary use of chemicals especially for weed control. It is our estimate that optimum production on our 1 million acres would require each year approximately 200,000 pounds of the basic ingredients. Add the various carriers associated with these and the bulk is considerable. With our present acreage and below optimum usage of these materials agriculture cannot support an industry but only an extensive network of dealerships. This is all that may ever be required.

And so on the input side of our scheme, the only associated industry that appears to be feasible is that concerned with the processing of the small portion of production that is cycled back into the production of successive crops.

It is when we become involved with the large quantities of materials that are produced that we must become really concerned with agriculturally associated industries in northern Alberta. All of our products, with the exception of the grasses and legumes produced for seed, are for human consumption or use and must be modified, processed, or converted to other forms of energy. Since only a very small portion can be, or in the future will be used in the area, what we are really considering is whether or not they should be transported before or after conversion.

From the 550,000 acres devoted to the production of cereal and oilseed crops we will on the average produce in the order of 16 million bushels of wheat, oats, barley, flax and rapeseed. As I have already shown, approximately 1 million bushels of this must be processed locally for seed and returned to the soil the following year. If we retain the reputation of the area for the production of high quality seed, both by virtue of having a rather higher percentage than normal of dedicated seed growers and a climate predisposed to the production of high seed quality, I believe it is reasonable to expect that we can export a further 2 million bushels of seed of the cereals and oilseeds. Much of this will continue to be processed locally together with that processed for local consumption and thus add impetus to the local seed processing industry.

We still have, however, a further 13 million bushels to be disposed of. Of this, it is reasonable to expect that 4 million bushels will be processed directly for human use. Probably 0.5 million bushels of wheat will be used for the milling of flour, 1 million bushels of oats for processed cereals, a million bushels of barley for malting and brewing and a further 1.4 million bushels of oilseeds for extraction. It is not conceivable to me that in the foreseeable future these industries will be established in the region. The primary reasons are that we do not have the consistency of climate to guarantee the raw material for a quality product, we do not have the population for large local consumption and, with the exception of milling wheat into flour, the processing of these materials usually causes an increase in bulk. Thus, if they must be consumed outside of the area, and this they must, they are better transported in their initial form to where they can be blended with produce from other areas prior to processing.

Having in this manner disposed of a further 4 million bushels of our production we have a remaining 9 million bushels. This will, during most years, be in the form of highly suitable feed for livestock. Before considering the disposal of this material I would first like to discuss the output from the 350,000 acres that we are devoting to the production of forage.

From the 75,000 acres devoted to the production of legume seed we can expect to average approximately 10 million pounds of seed annually and from a similar acreage of grass seed some 15 million pounds. These quantities approximate our present production. As stated when considering input into our production scheme, slightly less than 1 million pounds will be required for seed locally. The remaining 24 million pounds is for export, primarily to the United States and Europe. Much of this is and properly should be processed locally prior to export, giving further support to our local seed processing industry. In many instances processing may only involve rough cleaning to remove the most undesirable contamination, but this is the process that gives the maximum reduction in bulk prior to transport.

And finally from our forage we will also have 300,000 tons of dry matter stored in the form of hay or silage, or modifications of these. In the presently stored state these are not economical to export and are normally only moved with government assistance when there is a shortage of feed in other areas. There are now processes available for dehydrating and pelleting, and other means of converting this fodder into a high concentrate feed. Undoubtedly more efficient methods will be developed. These are forming the basis for industry in some of the more concentrated production areas and may eventually form the basis of an industry in this region. If so, it will provide us with a form in which it will be economical to export our forage. However, it is my personal opinion that such processing is in the very distant future.

Thus in disposing of our production we are left with approximately 300,000 tons of dry matter in various forms of fodder and with 9 million bushels of feed grain. This is sufficient to put to market each year, from our 1-million-acre production unit, approximately 75,000 beef animals and 150,000 hogs. This is 50,000 more beef animals and approximately 100,000 more hogs than are now marketed each year from a 1-million-acre production unit. The increases in number would have to be phenomenal to reach the production goal that we have implied.

Whether or not these increases are substantially realized only the future will tell. There is good reason to believe that Canada must increase primarily its production of beef if it is to approach future self-sufficiency in this product. It appears that much of this production must take place in the north and will reasonably do this if, despite our long winters, production costs can be kept at a competitive level. If this increase is realized, it would not only guarantee the efficient utilization of our home-grown feed products, but would create the need annually for some 8,000 tons of livestock feed supplement and also, with each 1-million-acre production unit, the utilization of 3 to 400,000 acres of our rougher lands for pasture.

This increase in livestock production, which is justified on the basis of our production potential and appears to be at least partially justified on the basis of markets, would seem to solidify the future need for local slaughter and processing of animal products not only for local consumption but for movement to the north, west and south. If it does not, we must continue to export our feed products or our live animals and sacrifice what appears to be the best potential for agriculturally oriented industry in northern Alberta.

In summary then, there appear to be only two possibilities for industry arising out of the needs of our main body of agricultural production. These are industries concerned with the processing of the large quantities of seed that we are capable of producing and marketing and of the animals that we are capable of producing but could have some difficulty in marketing.

Over and above this there are two specialty areas of production that must be considered. We have in the north a well established honey production industry based primarily on our production of legumes. For optimum production the 75,000 acres of legumes for seed that we have recommended in our production scheme require 20,000 colonies of bees, which on the average, should produce annually about 2½ million pounds of honey. It is doubtful if production will ever reach this level, but nonetheless, there is now a great deal of honey produced and in the future there will be more. However, the production is for consumption elsewhere and there is little advantage in processing honey prior to transport to the areas of consumption.

And finally, we have a potential for the production of horticultural crops. To satisfy our present population requires 800 acres of potatoes, 80 of carrots, 20 of turnips, 50 of cabbage, 150 of onions, 60 of corn, 80 of strawberries and 50 acres of raspberries. This would use only 1,300 of the half-million acres of river bottom and select upland which is considered suitable for these crops. Even so, current production is not sufficient to even approach our present requirements. Over and above this, there appears to be a potential for the production of cucumbers, tomatoes, cauliflower, lettuce, peas, beets, parsnips, black currants, saskatoons and blueberries. With certain of these, the north should be able to compete successfully for outside markets.

Were this horticultural production developed to even a small fraction of its estimated potential, it would increase our needs for fertilizer, insecticides and associated items. Further, there would have to grow in combination with this production storage, processing and marketing industries. I am convinced that these industries will develop as we become more concerned with intensive rather than extensive land use.

This then is my impression of the industry that will develop through the normal needs of agriculture in northern Alberta—processing of seeds, processing of animals and animal products, and processing of vegetables and fruits. The first we have now and the other two must come. Others may develop, but these will be based more on the ambitions of individuals than on the needs of agriculture. They will have less impact

on the agriculture of northern Alberta and less chance of success.

At what rate industry will come I do not know. This will depend to a great extent on production in the north and elsewhere, and on the demands on the world markets. But this I do know—that agriculture and its associated industries are inseparable and must work more closely together regardless of whether the industry is local or outside of northern Alberta. Producers in the north must know that industry must have an economical, stable supply of high quality raw material that can be converted to products for which there are firm markets. Industry in turn, must realize that the equipment and supplies required for agricultural production

in the north may differ from those required elsewhere and may have to be redesigned to meet the specific climatic, soil and crop requirements. Industry must also realize that the “northern product” may have regional peculiarities that require modifications in processing for maximum utilization, rather than rejecting the product because it differs from raw materials produced elsewhere. And finally industry cannot assume that it has a “captive” supplier of basic agricultural materials in northern Alberta that can exist without their strong support. For if they do this the supplier may cease to produce. Only with this mutual assistance and tolerance can both northern Agriculture and industry best serve themselves through serving the ultimate consumer on whom they both depend completely for prosperity.



HON. E. C. MANNING

A native of Saskatchewan, Ernest C. Manning was first elected to the Alberta Legislature in 1935, and in that same year was appointed Provincial Secretary in the cabinet of Hon. William Aberhart. A short time later he organized and became Minister of the Department of Trade and Industry, and has also held portfolios as Minister of Mines and Minerals, and Provincial Treasurer. He was Sworn in as Premier and President of the Council on May 31, 1943, and was appointed Attorney General after the June 29th election in 1955.

NORTHERN ALBERTA — THE SHAPE OF THE FUTURE

presented by

PREMIER E. C. MANNING

I AM delighted to have the privilege of being with you at this banquet tonight. Throughout today you have listened, those of you who were present at the Conference, to learned men who are specialists in their respective fields and who, therefore, spoke to you with the reserve and the cautiousness of the well-informed.

I am not an authority on any of the matters that I am going to talk to you about tonight and so I can speak to you with a much greater dogmatism of the less well-informed. One of the things which I heard emphasized in the session of the Conference this afternoon was that in almost everything that had been discussed, the eyes of those present, and this part of Alberta especially, are turned towards the future. People are more concerned with what tomorrow holds in store for this part of Canada than they are with the happenings of the past, and I think that is a good thing.

I would like to join in very sincere congratulations to the Northern Development Council, to all members of the Peace River Chamber of Commerce, and to all others who have had any part in sponsoring and arranging this Conference. Certainly, it has been very well arranged, I think we have all been able to get some idea of the tremendous amount of planning and work and detail that has gone into making it the success that it obviously has turned out to be.

Such interest on the part of the local people of this community points out not only the importance of the matters that are slated for discussion, but also a keen local awareness of their importance. And too often this is where people and organizations slip up. We are living in a highly competitive world. It is going to become more competitive in every field in the days that are ahead. And it is the people, the organization, the community that recognizes an important opportunity first, that wins where others lose. It is particularly appropriate that a Conference of this kind should

be held in this progressive centre which I think we could truthfully say is on almost the southern border of this great north-western area of Canada.

There is, as you know, a progressive shift of resources and industrial development towards the north, what you have called in your Conference, "The Changing Frontier", that holds much of challenge and excitement and opportunity in the days that lie ahead. Ladies and gentlemen I suggest to you that this north-western part of Canada is the last remaining large area on the North American continent that is rich in potential resources and still largely undeveloped. This puts not only the area, but Alberta, especially northern Alberta, the businessmen, the organizations, in this part of the country in a very unique position, where it is not only the validment of the northern part of our own province, but our geographic location as such that the northern communities of Alberta undoubtedly will become in the future, more and more the centres of operation for development beyond our northern boundaries up on into the Northwest Territories as this development reaches farther and farther into the North.

I think it is important at a Conference of this kind, to remind ourselves that actual development is not achieved by seminars and conferences and discussion. Such gatherings are valuable and they are important. They can focus attention on the potential and on the opportunities. They can search out the factors that are pertinent to sound growth and development then follow that up by doing everything possible to see that those essentials are available. But no amount of mere discussion, no amount of holding conferences, is, in itself, going to bring about this great era of development in which you have shown such an active and positive interest by convening this conference.

I would suggest to you tonight that there are at least five necessary ingredients to ensure the kind of development that all of us here are interested in seeing

take place in northwestern Canada in the days that lie ahead.

The first of these, of course, is obviously the presence of the basic physical resources to be developed. This involves, or this includes, not merely the productive agricultural land of northern Alberta and beyond, but the great potential in the era of mineral development and also, of course, the wealth of our forest resources that are spread over this same area. I think it is generally agreed that this northwest area of Canada, northern Alberta particularly, does have a very definite potential as far as the existence of these essential physical resources are concerned.

The second ingredient that you have to have for industrial development is energy resources. All industrial development requires energy. Fuels, oil, gas, coal, electric energy, these again are available, to a large degree, throughout this area in which your interest is particularly centered. We rate quite high, I think, in these particular attributes, so as far as both the physical resources and energy resources are concerned, there are no great barriers in the way of successful development.

There is a third factor that we can rightly add to these two, which is more difficult as far as this part of Canada is concerned, and that is the matter of transportation. You will never have large scale development of any area unless necessary transportation facilities are available.

We in northern Alberta and northwestern Canada, owe a tremendous debt to aviation. For so much of this part of Canada would never have been opened to the extent it has been if it hadn't been for the bush pilots and the pioneers in those fields, who came into these areas that were inaccessible by road or by rail and paved the way for the gaining of the information that has created the interest that is expressed in a conference such as this. Aviation, undoubtedly, will continue to play a very important part as more landing fields and landing strips and better facilities are available throughout the North. It is going to become more practical to use aviation to an even greater degree.

But this must be supplemented by a proper provision of highways, all-weather roads, and access by rail into these resources areas and resort areas if we are going to ensure the kind of development in which we are interested. As far as the province is concerned, we are trying to push our high system steadily into the north. There is still a great deal to be done, there are vast distances to cover, but this has to be. In the field of rail transportation, the Pine Point Railway that was completed some time ago into the Northwest Territories, has provided a very important access by rail into that rich area of provincial development.

It might be of interest to some of you here tonight to know that just this past week, we concluded an agreement between the Government of Alberta and the Canadian National Railway, under which they will construct, on behalf of the province, a resources railway, starting with the main line of the Canadian National and pushing northward into the coal and timber areas south of the city of Grande Prairie. I think it is

only logical to anticipate that with the passage of time, this resources line will be pushed on into the north until it logically should link up with the southern end of the Pine Point Railway which will then provide, for this whole vast area of northern Alberta, a much more direct rail route to the Pacific coast and the two main ports of Vancouver and Prince Rupert, which are pretty vital both for products going out and products coming in.

I am sure many of you businessmen are well aware of the interest on the part of the Japanese in some of the mineral resources of northern Alberta. I understand it is approximately two days shorter by ocean transport from Prince Rupert to Japan than it is from the port of Vancouver. One of the advantages of this resources line that is now being constructed ultimately to link up with the Pine Point Railway will be to give, first of all, a choice of ports, and secondly, if Japanese trade is involved, the advantage of being able to use Prince Rupert's facilities, with the closer distance by ocean to Japan and also avoiding the crowded and congested problems at the port of Vancouver as it is at the present time. So much for transportation, this is a field in which a great deal remains to be done, but a great deal is being done.

The fourth essential, of course, in industrial development is capital. You cannot have development unless you have somebody that is prepared to put up the risk capital necessary for the development. Now I am sure that all of us here tonight would, as far as it is possible, like to see Canadian people, certainly speaking from the Provincial Government, we would like to see the citizens of Alberta participate to the maximum degree possible in the financial aspects of financing the development of this northwest area of Canada. But we should be realistic and realize that in a young country with the type of development that is necessary, in a new and scattered area such as this Canadian northwest, we are also going to require substantial volumes of foreign capital as well as domestic capital. I think it is important that, as governments and as business organizations, we recognize that fact and be careful that we do not do anything which prejudices the opportunity of getting investment capital under proper conditions that will provide this absolutely essential ingredient of the development that we want to see take place.

The fifth, and last of the five essentials I would like to mention, I could put under the heading of climate. And I am not thinking particularly of the weather when I say the climate, although as somebody mentioned this afternoon, the climatic conditions of northern Alberta and the Canadian northwest cannot be ignored, whether you are talking about agricultural possibilities or even mineral and resources development, because these are factors which must be taken into account because of the additional cost which is involved when you have to combat long and severe winters and the other problems which arise from climate as you get farther into the north.

But I am speaking particularly, when I say climate, of the business climate, that we in this country must try and generate and maintain if we are going to

attract the necessary investment capital and the interest on the part of those engaged in resources development to become active in this part of Canada. I think it is important that we must acknowledge frankly that in our Canadian northwest we do have certain economic disadvantages that cannot be ignored. We do not do a service to our country, we certainly do not stimulate industrial development by giving a false picture of what the economic problems are in carrying on resources development in this particular part of the North American continent. I have already mentioned, for example, the transportation factors. Transportation is a costly business in the Canadian northwest. It is a factor that all industrialists are going to look at seriously before deciding whether they are going to gamble their capital on resources development. The long distance from markets with large populations, the fact that the great bulk of the production of the Canadian northwest for a long time come will have to be exported to those areas of Canada or the United States or farther abroad where there are the great centers of population demanding and requiring these products, this means high transportation cost and all of these things are going to be taken into account by those doing the developing.

These conditions, along with other factors that come readily to your minds, create high cost factors in carrying on development in this part of Canada as compared with many other places in the world with which we have to compete. When you are discussing the oil and gas resources development, I assume that this is one of the points that will perhaps be mentioned. I have often heard people discuss and have often been asked many questions about why the cost of producing oil here, where we have so much oil in this province, is high in comparison to oil being produced in some other places in the world. The simple fact is that conditions are not comparable at all. We are in a high cost area of production of these resources and we have to recognize that.

Now why do I stress these things? First, because I think to be realistic we have to face them. Certainly the industrialists that we look to for development are going to analyze them very thoroughly before they gamble their capital. Secondly, because I think it is so important that we do everything that is within our power to offset these certain economic disadvantages with which we have to live, by other factors that will counteract, in the judgment of developers, the disadvantages of these particular economic conditions.

Now, we can offer in this country, and in this province, and I suggest we should do our very best to see that we do offer, certain very attractive advantages in the highly competitive industrial world of today. For one thing, it is in our power to offer stability. Again, if I could use the oil industry as a good illustration, you know quite a few parts of the world that are big oil producing areas yet among the most unstable areas of the world politically. It is one thing to be able to go into a country and produce oil for a fraction of the cost you can produce it in western Canada, but I think the developer would think twice if he doesn't know from one week to the next whether his assets are going to be confiscated or destroyed in some local revolution or civil war or something of this type which

characterizes and creates instability in so many of those areas of the world at the present time. We have in Canada a unique opportunity to offer to those who are interested in resources development, a business climate that radiates stability and I suggest to you that in the unsettled world of today, that is going to become a more and more important factor and weigh heavier in the judgment of those deciding where they are going to spend investment capital than has been the case in the past.

We can lay down fair and equitable ground rules. The services risking their capital know that they are not going to be shortchanged by having the rules altered in the middle of the day. These are again factors that contribute to this matter of general stability. We can have an intelligent regard for the adverse effects of policies and programs which inflate costs which would lead to excessive taxation on industry. All of these are matters in which developers are vitally concerned.

An encouraging thing is, that while we cannot do anything very much about the climate as yet (I understand they are going to be able to in a few years' time), we cannot do very much to alter the slow population, the vastness of the area, the distance from markets, and these physical things, we do have in our hands, as a nation and a province, the power to control these factors which make a business that radiates stability and gives to those who have risked capital and engaged in these fields, a confidence which I think will go a long way to offset the economic disadvantages. I suggest to you, therefore, that these abstract or man-made factors are becoming increasingly important. The physical aspects can be ascertained with reasonable certainty; if you spend the money you can find out through surveys pretty accurately what the physical resources of any area are, you can get the statistics on energy resources, you can have studies made of market potentials and costs. Most responsible companies can raise the capital they need if they have a project in sight but the unpredictable elements are in the sphere of government; government policies and government programs, for these are the areas in which, in so many parts of the world today, there is a situation of instability and uncertainty that makes business very, very hesitant in their decision as to whether they should gamble long-range investment of risk capital or not. Every time some segment of industry is taken over or socialized by government, it engenders fear and concern in industrialists throughout the entire nation as to whether this is the future of their business. This is becoming increasingly important.

I suggest to you that welfare programs that impose, that have built-in costs that inevitably impose, heavy increases in taxation that thereby inflate costs and inflate prices have a very definite and adverse effect on the decision of industrialists and business people in deciding whether the areas where these things prevail are areas where it is wise to risk investment capital. So my suggestion to you tonight as businessmen, as those interested in this development, is let us be realistic in appraising both the problems and the obstacles, physical and otherwise, that must be overcome. Let us recognize that, while we cannot do much about the

physical aspects, we can do a great deal about these man-made factors which either will create attitudes of uncertainty on the part of industry and business or attitudes of confidence and encouragement for them to risk capital and go ahead with the development.

There is much that needs to be done on the part of such organizations as Chamber of Commerce and Government. Business organizations are in a position to compile factual data on what is known regarding physical resources, regarding fuel and energy resources, past and potential, transportation and communication facilities, and projections; this is information that is most valuable to prospective developers. I think business organizations are well advised to spend time and money in compiling factual information of that kind. I stress the word "factual" because it is very important that you avoid simply trying to paint a rosy picture and glossing over the difficulties that have to be faced only to find when these developers get down to cases they are going to discover the difficulties anyway, they are going to analyze them, they are going to say: "Well, the information we got from that organization wasn't much help, it was colored as a propaganda piece of work rather than a cold, hard factual analysis on which we could base a decision."

If I may, I would like to suggest to you as businessmen, particularly as business organizations, I think it would be wise if you avoided, and I think it would be wise if governments avoided, programs or recommending programs under which we try and get industrial development by artificial stimuli. I mean by that, if we are going to get into the field of special tax concessions and financial subsidies and things of this kind, there may be a certain place for some of these under certain circumstances, but they are artificial factors as far as sound industrial development is concerned. One other great weakness is that no industrialist can know for sure that these programs are going to continue on into the future. If the economics of his development are dependent on some artificial financial factors of this kind created by some government program or community tax concession, and then a year or so down the road, the rules are all changed and this is scrapped and abolished, immediately that development, which may have been sound economically with that assistance, becomes unsound economically. Then it is in trouble. This type of thing creates a great deal of uncertainty and I think it is far better, in the field of business and government, to try to assist industry in the field of research which is a proper government responsibility, in the field of information, in the field of training of technical personnel, of all these many things that governments can and rightly should do to assist industry. I suggest that this is a far sounder way to encourage industrial development than getting into mere artificial tax concessions or financial subsidies which are subject to change from year to year, therefore are certainly not definite and something on which industry can rely.

Governments, as well as business organizations, have a great deal that they need to do. Not only in the matter of compiling data and training personnel, but I think you will agree that governments also have a responsibility in the field of conservation; as no matter how many resources we have, we certainly have none

to waste. Sound conservation measures are a responsibility that cannot be evaded. Another factor that is becoming of increasing concern is the matter of pollution control; pollution of our rivers, and pollution of the atmosphere. These are areas of government responsibility in which it is essential that the rules be clearly spelled out so that developers will know exactly what they have to comply with in order to meet conservation requirements and pollution control requirements. There is certainly room, and certainly need for an all-out effort on the part of all types of business organizations and governments combined.

In closing, may I simply remind you, let us not forget that we are talking about perhaps the most exciting area remaining in North America from the standpoint of the long-range potential of development that exists in this part of the continent. I think this should inspire enthusiasm on the part of all interested and with that enthusiasm we should combined good, practical, sound common sense.

May I close by suggesting that there is another sphere altogether in which it may well prove that, here in northern Alberta and on into the great Canadian northwest with all this potential before it, in the days ahead we may be able to make a contribution to Canada as a nation that we very rarely think of when we are discussing this kind of development. Now, some of you may not agree with this, but I think some of you will. It is my belief that the Canadian people, on the whole, are a little bit inclined to be introverts, we are a little bit inclined as a nation and as a people to look inward at ourselves. This seems to be part of our make-up and when a people, whether it is an individual or a nation, becomes introverted it develops a tendency to become critical, it sees the faults of itself and its fellows and we get into bickerings and arguments about a whole lot of things that, in relation to the great whole in which we should be playing our part, are perhaps not really the vitally important things at all.

Now I don't know anything about psychiatry, but I have heard some people who are supposed to know something about it say that the best thing you can do for an introvert is get him some new interests and a far bigger and broader field so instead of looking in, he starts looking out and he becomes enthused and wrapped-up in some great big thing that makes all these other things he has been fussing about seem to be pretty insignificant and pretty small.

I have a conviction that Canada would be helped as a nation if we would recognize this tendency and would do something about it by doing a couple of things that would broaden our horizons as a people and get us a more extrovert attitude instead of that of an introvert. The two things I would suggest are one internal, and one external.

Externally, I would like to see Canada, as a nation, specialize in developing a type of assistance to some less fortunate nation of this world that I think should be selected carefully. I say specialize for this reason, because I think there is a tendency today in international relations where every nation wants to get into the act and help the undeveloped nations. This is a very good motive, it is a commendable thing, but it is a rather haphazard thing so we spend a few million

here and we spend a few million there and we spread it all over in a sort of a general program. It does some good. But I would like to see Canada pick out three, four, half a dozen (I don't know what the number should be) of the emerging undeveloped nations, not to assist with handouts (that isn't what these people want), but to assist them in some scientific research, to assist them in training technical personnel, in specific developments.

I have a feeling, maybe wrongly, but I have a feeling that if as a nation and a people we did this, we would become an integral part of a specific program in the emerging world of today that would tremendously broaden our horizons as a people; get our minds off ourselves and our petty little domestic fusses that we waste so much time on today; help us to grasp the size of the world in which we live, its challenges, its needs, and its opportunities.

Domestically, I can think of nothing that I believe would give a greater stimulus to the enthusiasm of Canadian people than a sound, practical concentration on the intelligent development of this one remaining area of the North American continent to which I have referred to as the Canadian northwest with its vast potential resources for the future. For it is a practical thing, it is a thing to challenge the pioneer spirit that has become dormant in so many of our people. Here

is a thing which has all types of excitement mixed in with it for those who like excitement. I cannot help but feel that if we take the one I have suggested externally and the development of the Canadian northwest internally as two specific objectives, that Canada as a nation not only would get the benefits of development; not only would get the satisfaction which comes from helping specifically a few less fortunate nations in the broad arena of the world; but I have a feeling that, as a result of it, we would find the attitude of the Canadian people change and we would become more inclined to look at the broad picture of far wider horizons than most of us look at today. I am convinced that one of the results of that would be a diminishing of our internal squabbling and tensions and confusion that has plagued this country so badly in recent years.

So it may well be, that you who are responsible for the sponsoring of a conference such as this, which is just one step in this total picture, may when the story is finally written find that you have contributed something to the spirit and the attitude of the outlook of the Canadian people that will go far beyond just the number of barrels of oil or the number of tons of minerals or the number of cords of plywood or anything of this kind that we have been able to produce in the process of developing this great area of the Canadian northwest.



L. J. RICHARDS

Mr. L. J. Richards was born in Arnett, Oklahoma. He received a B.S. degree in Civil Engineering from Oklahoma State University, and is a graduate of the Harvard School of Advanced Management. Mr. Richards became associated with Continental Oil Company, one of the major shareholders of Hudson's Bay Oil and Gas Company Limited, in 1937. In 1948, he came to Hudson's Bay Oil and Gas as Chief Geophysicist and moved up through various positions to become Executive Vice-President in 1962. He has been a director since 1957 and in June of this year, he was elected President of the Company.

CHANGING FRONTIERS IN OIL AND GAS

presented by

L. J. RICHARDS

MAY I at the outset express my appreciation for the invitation to take part in this Northern Alberta Conference, and at the same time thank my old friend Don Mackenzie for his introductory remarks.

The title for this presentation, "Changing Frontiers in Oil and Gas", is indeed appropriate, for history will no doubt record that it was the search for oil that transformed much of Alberta from a single agricultural economy into a dual resource province.

My allotted responsibility in this discussion is to look back briefly over our shoulder at the past history of this development, and then trace its progress to the present day, where the combination of risk capital and improved technical skills have already expanded Northern Alberta's economic horizon.

In spite of all this new activity, there are still a great many misconceptions associated with the vast region north of Edmonton. One of the most popular is to visualize it as frozen waste land under whose surface lies a wealth of mineral resources. The assumption is therefore commonly accepted, that any venturesome person who can fortify himself against the isolation of a northern winter will, as a matter of course, obtain a bountiful reward. Gentlemen—you and I know that it is not that simple, for while each of us has great confidence in the future of northern Alberta, the realization of our hopes and expectations will no doubt be challenged by many disappointments.

There are, of course, a number of methods to measure the progress of oil development. Perhaps the most effective of these is to equate dollars invested against the return on this investment, and then with the help of our crystal ball we can with some accuracy speculate on the potential growth of a given area. Before evaluating the performance record of northern

Alberta, it might be helpful to remove any conjecture on how an exploration program comes into existence. As an industry we are often pictured as a group of fast buck artists who move into an area with vast quantities of promotional money, immediately find oil, and then like a swarm of locusts move on to another location. Such a conception of course bears no resemblance to fact, for aside from the difficulty of securing the necessary exploration capital, a substantial amount of technical information must first be obtained before any consideration is given to drilling a well.

As in any virgin territory, the first major task in northern Alberta was to send geologists into the field to search for encouraging surface features which might indicate possible areas of hydrocarbon accumulations. The geophysicists followed up with their seismic equipment to try to pinpoint areas which could be potential traps in which oil or gas may have accumulated, and thus determine prospective exploratory drilling locations. The work of these scientists required the development of highly specialized transportation equipment. You can imagine the frustrations we encountered when we first sent motorized vehicles into muskeg country. Over the years, however, we have succeeded in developing more sophisticated instruments and mobile equipment designed to overcome the peculiarities of northern terrain.

If I could direct your attention to the graph on the screen, you will see that from 1947 to 1951 there was a rapid build-up in seismic activity. During the peak year in 1951, the oil industry spent approximately \$12 million on seismic work alone.

From 1951 to 1961, geophysical activity declined steadily, and although these years saw more money being diverted into an exploratory drilling program, a total of \$110 million was spent on geophysical surveys

in northern Alberta during the period 1947 through 1964.

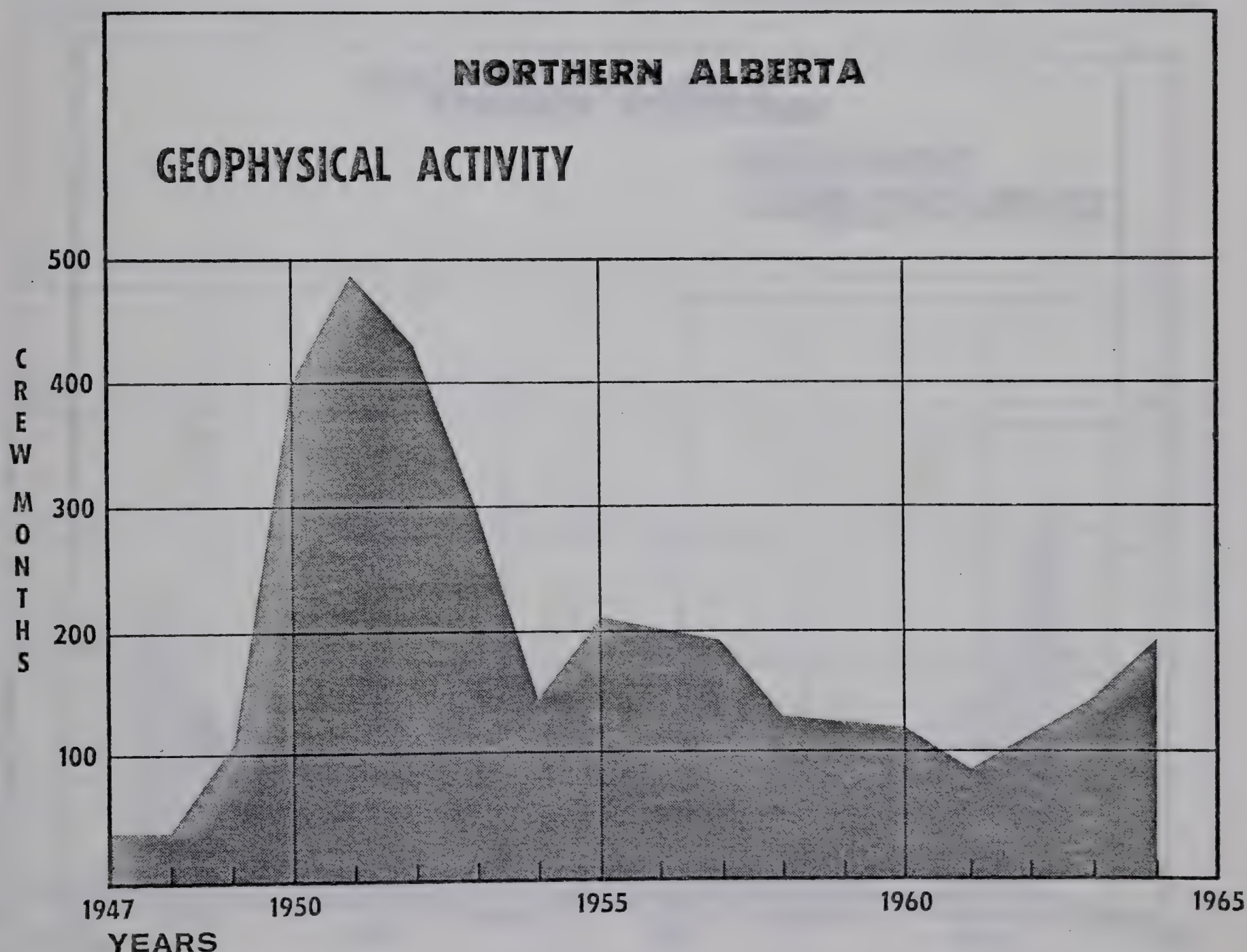
As the research of the geologists and geophysicists was progressing, competition for exploratory drilling rights also showed a marked increase. Months of analyzing and evaluating of geological and geophysical data provided a new impetus to the acquisition of exploratory acreage and, here again, the oil industry was called upon to increase its investment in the hope that a reserve would be discovered and therefore justify the substantial expenditures.

Turning to our graph once again, you will see that while geophysical activity began a general decline from 1951 to 1961, exploratory drilling reached its first peak in 1958. It is not unusual for exploratory drilling to follow initial geological and geophysical work by as much as five years. During this interval a company must decide on a drilling program and then spend anywhere from \$100,000 to \$1 million on each exploratory well. A significant cost to consider in exploratory drilling in northern Alberta is the cost of building access roads to locations which are remote from the widely separated highways of this area. It is not un-

usual for an operator to spend as much as several hundred thousand dollars pushing a road through the bush and muskeg to the site of a wildcat location.

Although only one exploration well was drilled in northern Alberta in 1947, activity increased each subsequent year to a peak of 55 wells in 1952. Exploratory drilling fell off to a yearly average of 34 wells during the next three years, but in 1956 the prospect of marketing gas from the Peace River area through the proposed Westcoast pipe line system encouraged operators to step up their efforts to find and delineate gas fields which could be served by Westcoast. This activity, together with an oil discovery at Red Earth in 1956, is reflected by an increase from 35 wells in 1955 to a new peak of 109 wells in 1958.

Poor discovery experience and a deficiency of markets for gas caused another decline in exploratory drilling activity in the period from 1958 through 1961. However, in view of promising oil discoveries such as Deer Mountain, Snipe Lake, Utikuma and Nipisi — and those made recently in the north-west sector of northern Alberta, plus a favourable gas market outlook for Calling Lake and Marten Hills gas—it is safe to



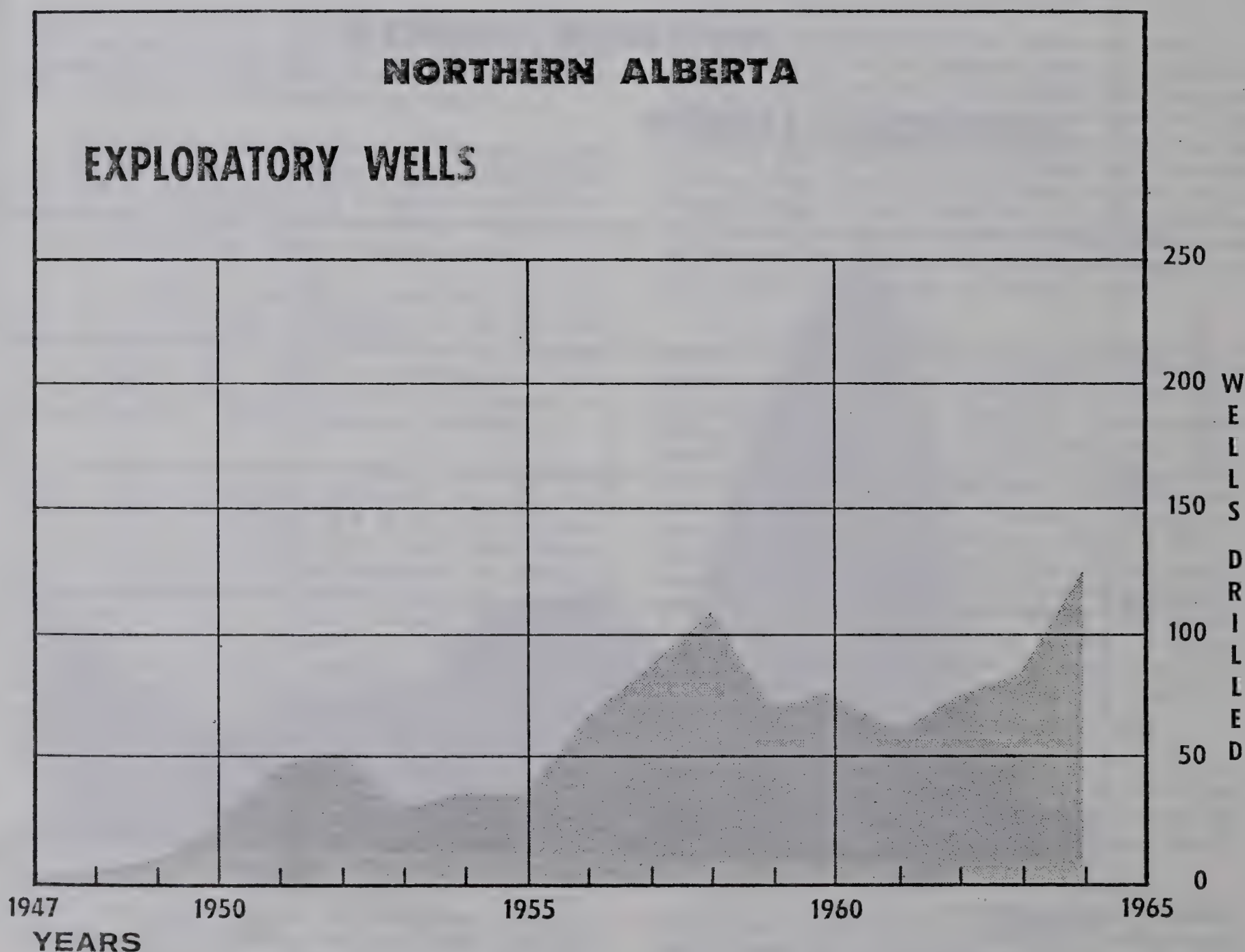
predict that the trend in exploratory drilling, which has been rising since 1961, will go up very sharply in the immediate future.

At this point we should perhaps recall the partnership arrangement that exists between the people of Alberta through their Government, and the oil developer, whether he be an oil company or an individual. Simply stated, the law provides that one half of every reservation must be returned to the Province, and, as a rule, after a sizeable amount of exploration has been undertaken by the developer on the property. In the event oil or gas is discovered on the block of land, the Government is then in a position to offer the reclaimed portion for re-sale to the highest bidder. These Crown sales, as they are known, represent a substantial annual source of income to the Province and, on the other hand, they also serve to make our industry one of the most competitive in the nation.

As this next graph indicates, a development drilling program usually commences some time after a successful exploratory well. In many cases, especially with natural gas, these wells must be capped until it becomes economic to develop the reserves and invest in transportation facilities. There are a number of northern Alberta gas discoveries which have not been

exploited because of the lack of market outlets. For example, gas fields at Tangent, Belloy and Phil Can, discovered back in 1951 and 1952, are still shut in awaiting a market. Gas discoveries in other sectors of northern Alberta have not been delineated because of the long delay anticipated for gas sales. Once the fields in Central Alberta have been tied to markets, I am sure gas pipelines will push into northern Alberta but, in the meantime, many millions of dollars, which could otherwise be effectively employed, are tied up in shut-in gas wells.

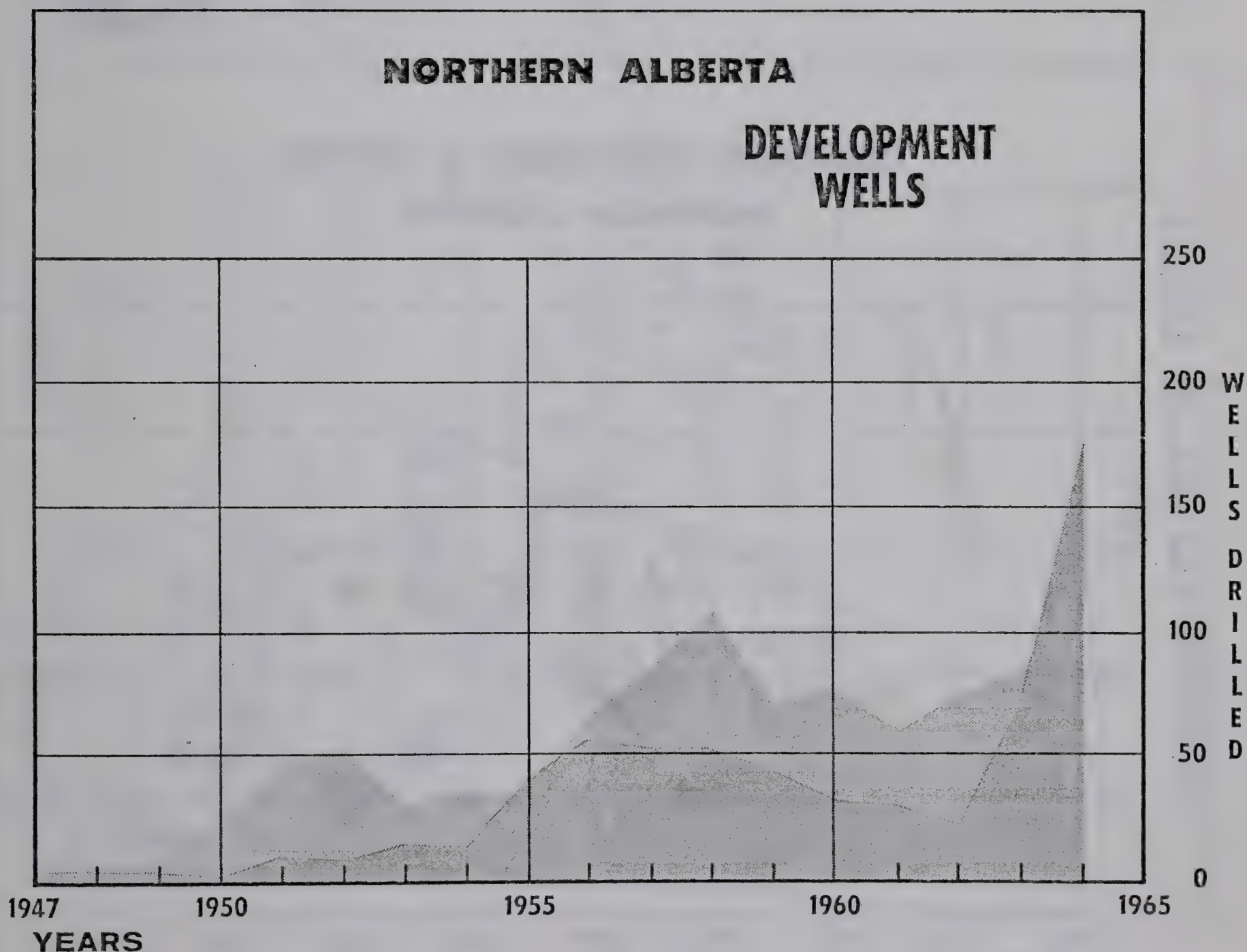
Development drilling in northern Alberta was at a relatively low level from 1947 through 1954, again reflecting a general lack of markets for natural gas. However, activity increased between 1955 and 1958 as fields such as Red Earth and Gordondale were being developed. This period of peak activity was followed by a decline in development drilling which lasted through 1962. Since that time the drilling pace has picked up significantly and, as the graph indicates, a total of 176 development wells were drilled north of the 55th parallel during 1964. The upward trend of the past two years reflects the development of such fields as Deer Mountain, Snipe Lake, Utikuma, and Mitsue.



The over-all work of the oil and gas industry in northern Alberta has been rising steadily since 1961, indicating that this area is becoming increasingly important as an exploration region. Back in 1950, there were relatively few proven oil and gas reserves north of the 55th parallel. As shown by this map, most of Alberta's discoveries had been made in the Edmonton area. By 1955, more reserves had been found in the North, but industry activity had been largely concentrated in central Alberta where geologic prospects were favorable, and where transportation facilities were established. However, by 1960 a positive trend toward the North was firmly established, and the discovery of really significant reserves brought about the rapid increase in development drilling. The discoveries I referred to vindicated the judgment made years earlier when the oil industry sent its people into this country to find oil and gas. From 1960 to 1965 the industry intensified its efforts and made some spectacular discoveries and now names (mentioned previously) like Mitsue, Marten Hills and Zama Lake are well known throughout the province. These successes have stimulated new interest in the industry and at present great attention is being given to the most recent find at Rainbow Lake. The Rainbow Lake discovery is of prime

importance to northern Alberta—not only because it represents more oil, but because of the particular rock formations in which it occurs. Most of the oil and gas reserves in Alberta have been found in three formations—the Upper Cretaceous Cardium, the Upper Devonian Leduc Reefs and the Swan Hills Reefs. The Rainbow Lake discovery apparently occurred in a Keg River Reef, which is an older formation which had never before yielded a commercial oil discovery. Thus the Rainbow Lake play opens up a wide new horizon for exploration. Another significant factor here is the proposed construction of a pipe line which will connect new fields in northwestern Alberta with major trunk systems at Edmonton.

The cost of carrying on the over-all exploration and development program in northern Alberta has been great, and cumulative industry expenditures at the end of 1964 are estimated at \$575 million. On the other side of the ledger, after paying production royalty to the Alberta Government, municipal taxes, production costs, pipeline costs and so forth, we have received back only about \$88 million. As this graph indicates, the variance between expense and income has been widening. You can therefore see that earning a profit

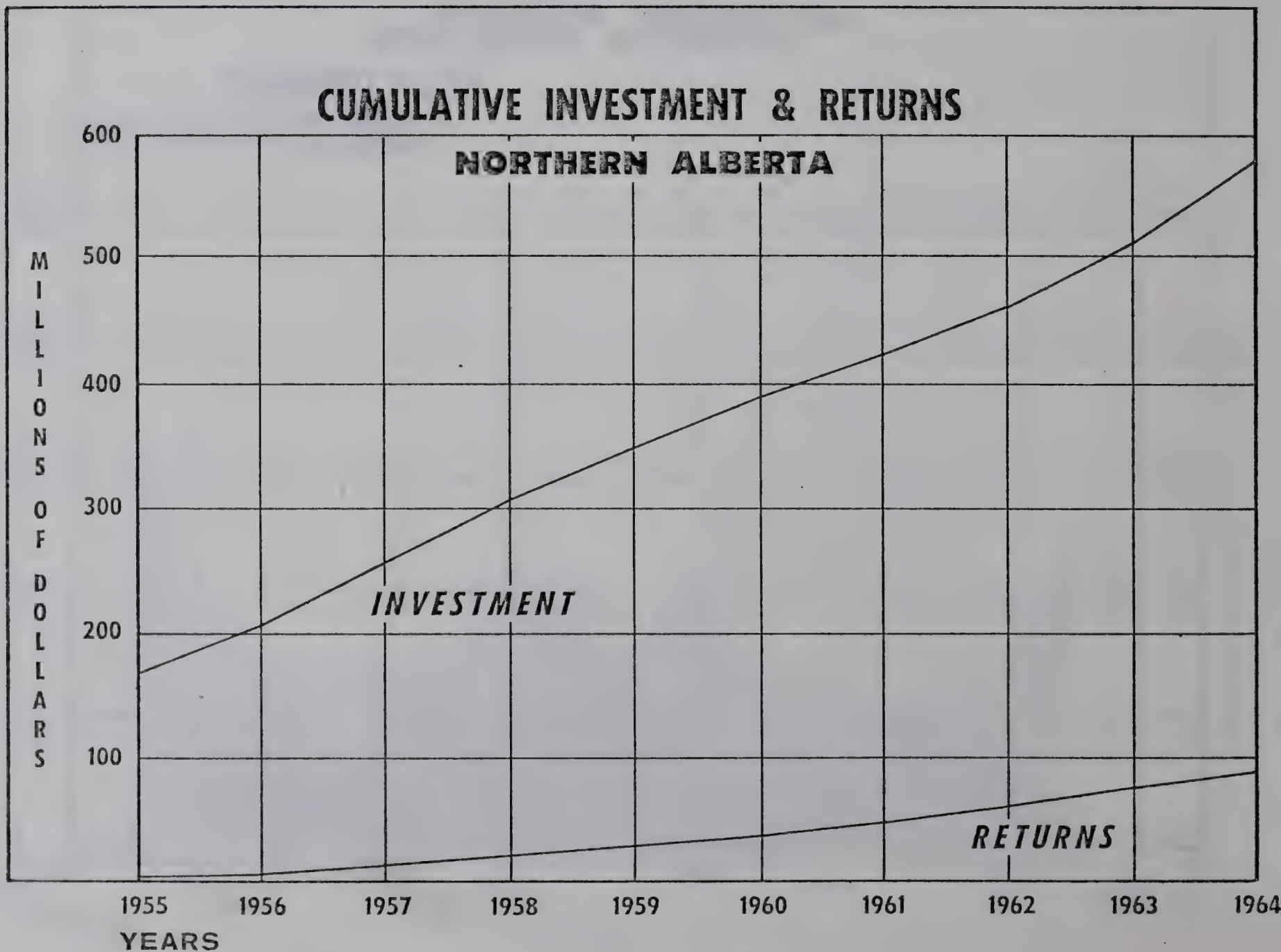


in our business can be a long term proposition. It will be many years before the industry as a whole reaches the "break-even" point in northern Alberta, in spite of the fact that production of both oil and gas in the area should begin to increase considerably as a consequence of the new discoveries.

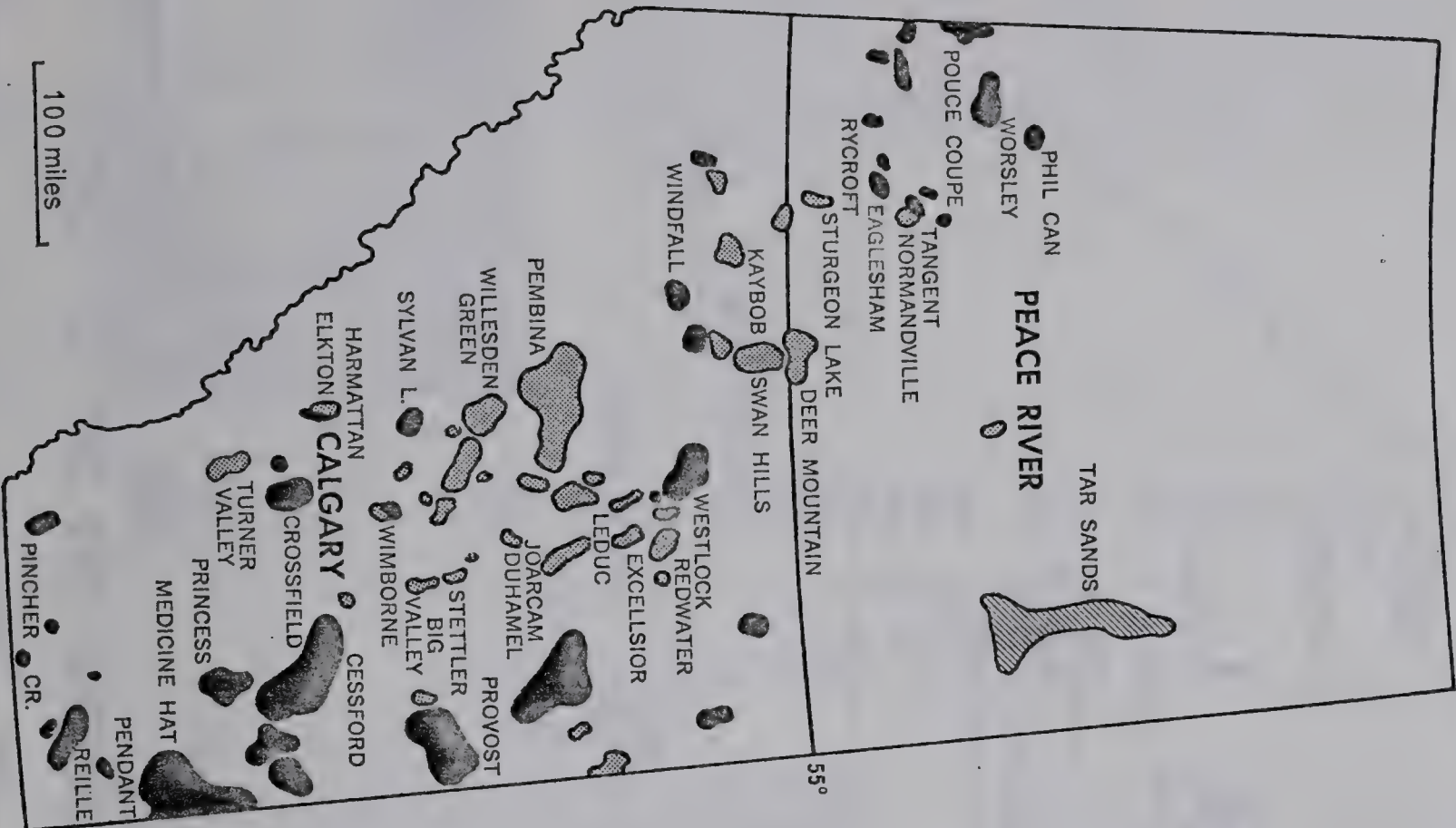
So far, we have dealt only with what is called the conventional oil industry, but I would like to turn your attention for a moment to development work now being done on the Athabasca Tar Sands. Certainly this immense hydrocarbon deposit is the world's largest known single mineral deposit, and its potential is almost beyond description. No one knows just how a deposit of about 600 billion barrels of oil came to be laid down in one place, but we do know that the portion of the Tar Sands which can be economically recovered is estimated at roughly 300 billion barrels. Northern Alberta therefore holds a recoverable hydrocarbon deposit which approximately equals all of the rest of the world's proven supply of crude oil. To try to get some idea of how much oil 300 billion barrels is, let me point out that the United States currently uses close to 11 million barrels of crude oil every day. The Tar Sands could provide this amount continuously for 75 years.

You are no doubt all aware that in the fall of 1967 the Athabasca deposit will begin to yield 45,000 b/d of what is called synthetic crude. This term simply means that the crude is extracted in an unconventional way. The introduction of this crude oil into Alberta's over-all production will mark the first major success in recovering oil from the Tar Sands, but it is only one of several proposals. Many major oil companies are carrying on efforts under a variety of partnerships designed to find new and cheaper methods of recovering these reserves. As these methods are perfected, it is expected that Alberta's Oil and Gas Conservation Board will grant further production permits. These permits will be designed to allow a gradual build-up of Tar Sands crude production so that the conventional oil industry in Alberta will not be jeopardized.

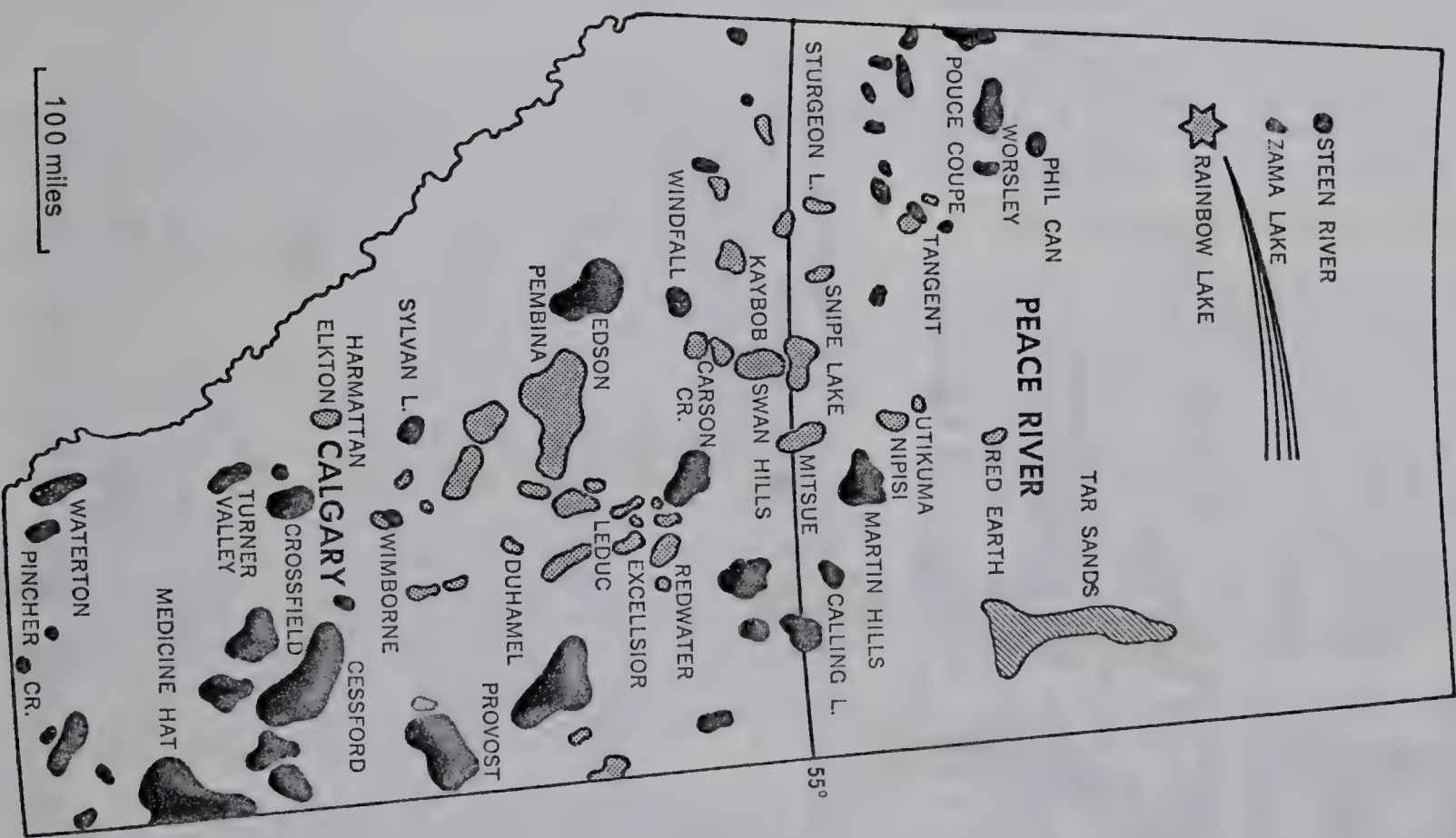
All of this development at Athabasca, combined with conventional exploration, development and producing operations, has focused the attention of the oil world on northern Alberta. The Tar Sands oil must be counted as a major factor in Canada's oil development and is expected to greatly enhance Canada's position as a supplier of the world's energy needs in the years to come.



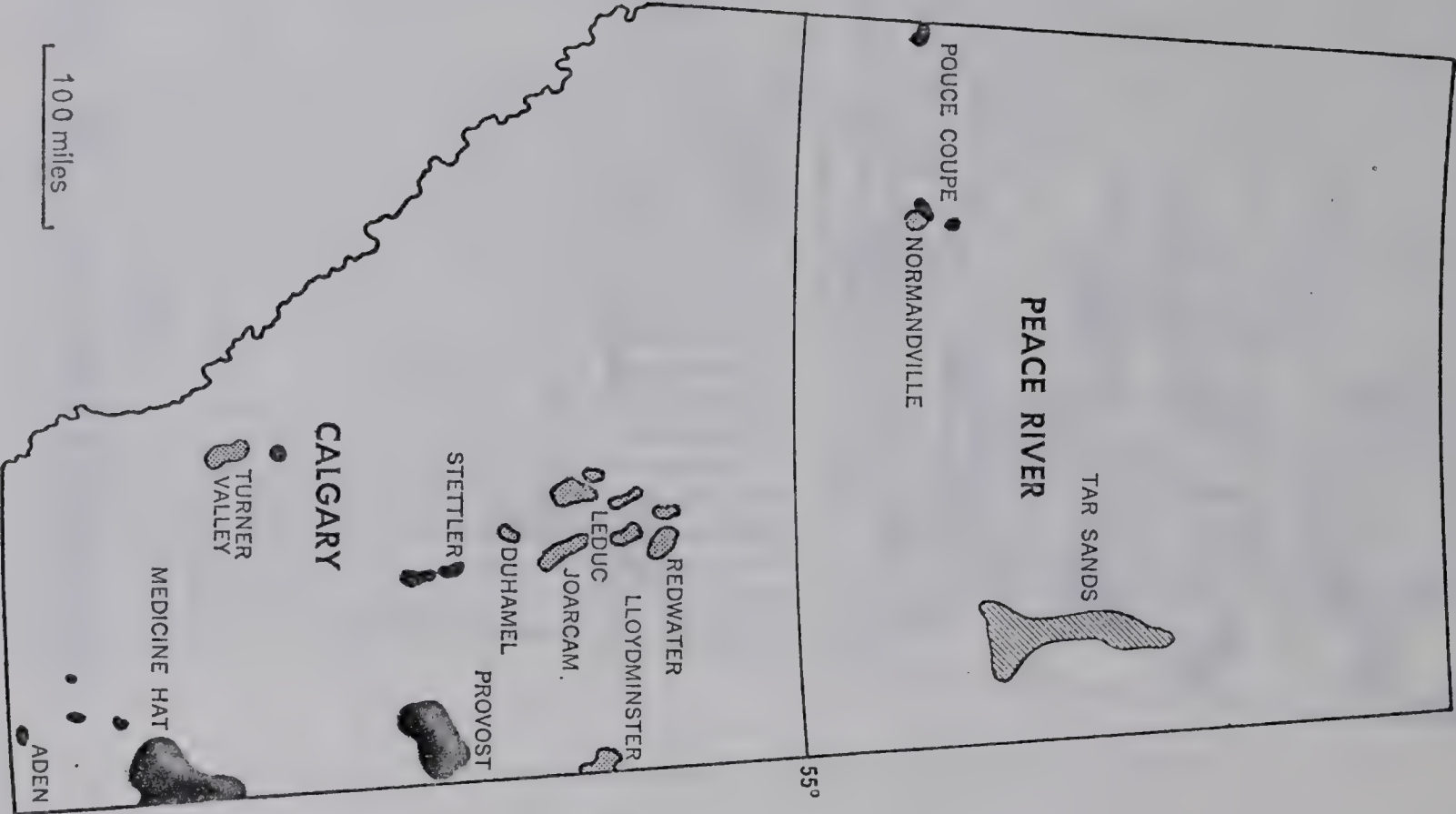
ALBERTA OIL AND GAS DISCOVERIES 1960



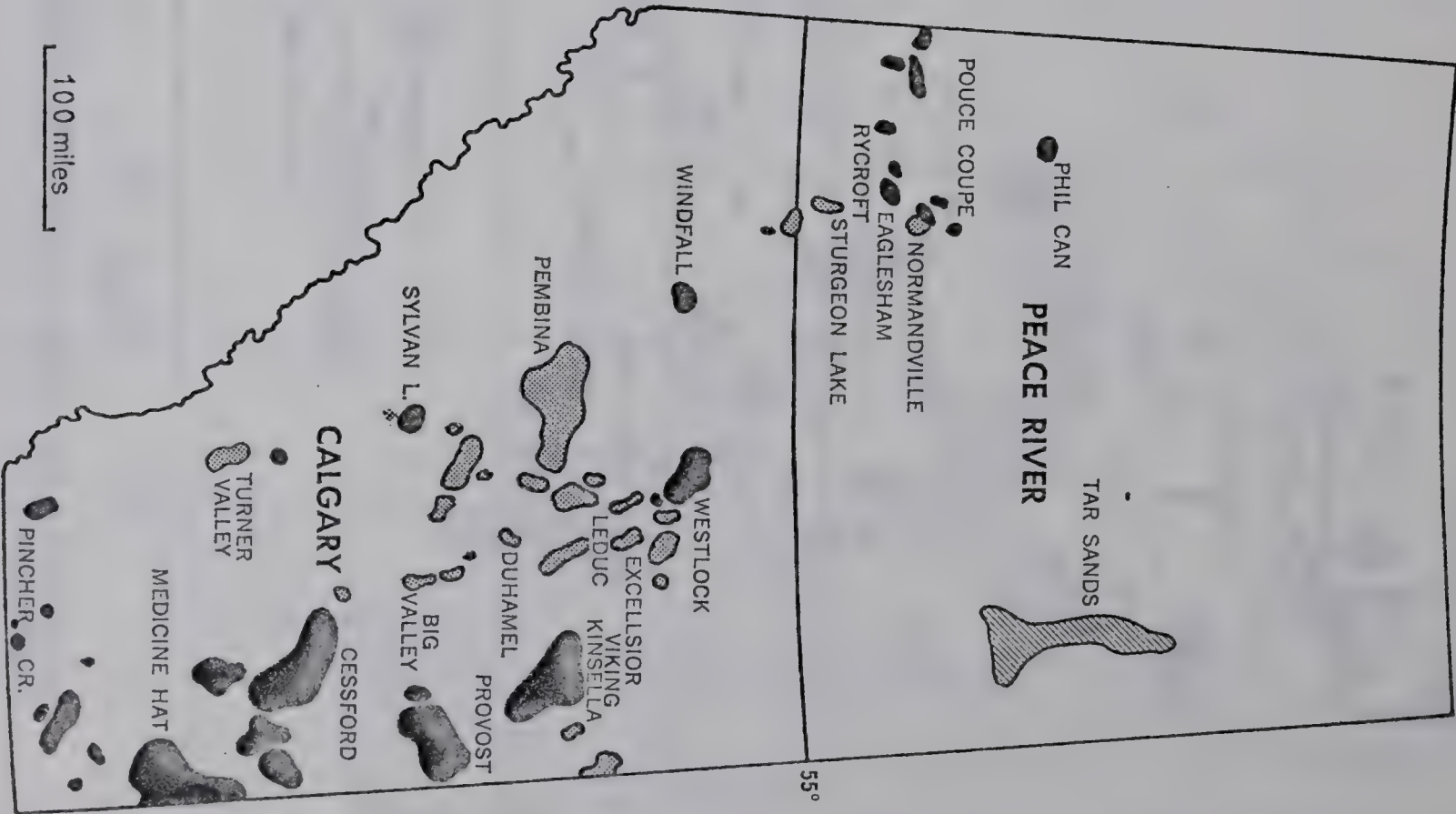
ALBERTA OIL AND GAS DISCOVERIES 1965



ALBERTA OIL AND GAS DISCOVERIES 1950



ALBERTA OIL AND GAS DISCOVERIES 1955





O. H. BLEXRUD

Owen Blexrud began his career in the oil business in 1947 when, following his graduation from the University of Wisconsin with a M.Sc., he joined the staff of Mobil Oil Company of the United States as field geologist. He remained with the parent company until 1961, when he was moved to Calgary to become President and General Manager of Mobil Oil of Canada, Limited. This firm became known as Socony Mobil Oil of Canada Ltd., in 1962. Mr. Blexrud is also a director of Petrogas Processing Ltd., South Saskatchewan Pipe Line Company, Producers Pipeline Ltd., and Westspur Pipe Line Company.

THE OIL AND GAS INDUSTRY IN NORTHERN ALBERTA

presented by

O. H. BLEXRUD

President and General Manager, Socony Mobil Oil of Canada, Ltd.

LADIES and gentlemen, you have just heard a current assessment of industry activity and I think it is clear from Mr. Richards' presentation that the oil and gas industry looks to northern Alberta with high expectations.

This morning I would like to present a brief look into some of the functions and objectives of our business which I believe should develop a picture of what oil and gas development may mean to northern Alberta.

The primary objective of individual oil companies and the industry as a whole, is to profitably find and produce oil and gas reserves. In general the sequence of events which lead us down this road is marked by well-defined and well-planned stages of exploration and development activity. I might hasten to add, however, there are many barriers, detours, and washouts along the way which impede progress toward our objectives.

In reviewing the exploration history of northern Alberta and the several stages of exploration planning and activity required to evaluate a new prospective area, Mr. Richards has described the first stage during which relatively few people are required to get the job done. I think it is important to emphasize that these early stages of exploration require a considerable expenditure of time, effort and money—resulting in few rewards as compared to the many disappointments. With odds of only about 5% in favor of finding an economic discovery it is readily apparent that ours is a "high risk" industry, and that the rewards must be sufficient to justify the risk.

Let us assume that our exploration efforts are successful and a commercial oil or gas field is discovered. Activity accelerates—companies scramble to acquire land and there is a need to find out as soon as possible the nature and extent of the discovery. This

is the stage the Rainbow area of northern Alberta is in right now, a stage marked by rapid build-up of drilling activity, land sales, pipe line construction and in general a desire and need to get things done right away.

Eventually, the productive area becomes pretty well defined through the drilling of wells—some of these are producers and others are dry holes. The boundaries of the field have been determined and plans are made for production. After production facilities are installed, the field area becomes less active. Relatively few people are required to operate the field compared with the number required when the field was being discovered and developed.

Now let us look briefly at how a field is produced.

When an oil field is found crude oil, gas and sometimes water are produced. Water and gas are separated from the crude oil at the surface. The water and other fluids may be treated and injected back into the formation, thus helping to maintain reservoir pressure and boost the total ultimate recovery, which in turn will prolong the time when pumping units need to be installed at the wellheads. The gas is conserved by utilization for field activities—injecting back into the formation to help maintain reservoir pressure or transported by pipe line to gas markets. The crude oil is moved by pipe line to refineries.

If it is a gas field, several things might happen, depending on the nature of the gas and the market conditions. A wet gas would likely be processed at the field to remove the gas liquids. Sour gas would be treated at the field, and where the hydrogen sulphide content is sufficiently high it could be recovered as elemental sulphur. The sweet gas would be sold if transportation facilities and markets were available.

Less than 10 years ago, a gas discovery was not highly regarded in the industry. Alberta, about the only market at that time, was well supplied with gas, and prospects for additional sales were limited. Consequently there was little or no incentive for a company to explore for gas and the industry tended to shun areas that were likely to yield gas instead of oil.

However, with the development of long-distance pipe line transportation and the opening of markets on a nationwide and continental basis and the granting of export permits, the picture has changed considerably. Gas prone areas are now attractive exploration risks, and gas and its by-products have become profitable for the industry, and a significant source of revenue for Alberta.

One of these by-products, sulphur, is currently in such large demand that Alberta's production is hardly keeping pace with demand. Sulphur is transported mainly by railway at the present time and will probably continue to be for some time to come. However, research in the widening application of pipe line transportation to all forms of goods, including sulphur, suggests that many more miles of pipe line might be laid in Alberta in the years ahead to carry products other than oil and gas.

Now I would like to turn specifically to northern Alberta where discoveries have been made as a result of years of earlier exploration evaluation and investment. The discovery of oil at Snipe Lake, about 80 miles east of Grand Prairie was followed last year by discovery of the Mitsue field, located southeast of Lesser Slave Lake, and early this year the Nipisi field was discovered about 40 miles north of Mitsue. Later in the year discoveries were made in the Rainbow Lake area, about 180 miles north of Peace River.

Each of these discoveries yielded important geological information which will help guide the industry in its efforts to uncover additional reserves of oil and gas in the northern regions.

As reported earlier by Mr. Richards, despite the many years of exploration investment and activity in northern Alberta, it was not until this year that oil was discovered in the Devonian Keg River formation at Rainbow. Geological information indicates that the Keg River formation is present in northern Alberta, northeastern British Columbia, and extends into the Northwest Territories. This formation is characterized by reef build-ups in certain areas which hold promise of being significant reservoirs of oil or gas or both. It is obvious, with the incentive provided by the discovery at Rainbow, that industry will be aggressively evaluating the potential of this large prospective, but as yet unproved, area. I emphasize the word "prospective" because final evaluation can only be made with the drill.

The recent announcement that a pipe line will be built this winter to carry Rainbow crude to the Edmonton area will also provide an impetus for increased exploration in the area. There will probably be as many as 30 drilling rigs working in the area this winter.

What will be the impact of this activity? It is already evident that the Rainbow area will be very

active in the months ahead. The industry will require roads leading from the Mackenzie highway west into the site of this activity. These roads, built by contractors, and paid for by the oil companies, will be added to the over 200,000 miles of roads and trails that our industry has already created throughout parts of northern Alberta.

A development like Rainbow also creates an immediate need for oral communication facilities and Alberta Government Telephones is already expanding its micro-wave system into this area. I understand another micro-wave extension is being made by AGT to link Edmonton and the oil sands community of Fort McMurray. The oil industry is a big user of communications equipment. The province-owned AGT system lists 10 oil industry companies among its top 20 net revenue sources. An AGT spokesman has stated that oil industry companies are quick to take advantage of technological advances and use a wider range of AGT customer communications equipment than any other type of Alberta company.

Air travel also becomes important in development of a newly discovered area and flying services are called upon to augment the equipment individual companies may own. The equipment varies from the smallest passenger plane to big transports. The building of landing strips in new areas is a must.

Drilling crews and supervisory personnel from oil companies usually live in their own camps at the well-sites. Some of the service and supply companies will probably use nearby towns as supply bases, just as they are presently doing in Peace River in the case of Rainbow. Because of its location on the Mackenzie Highway and its airport facilities, Peace River will probably see a lot of traffic in both personnel and vehicles to and from the Rainbow area in the coming months. There will likely be some demand for accommodation, food, entertainment, recreation and possibly other community services.

I am not suggesting that Peace River is on the verge of explosive growth because I am not sure just how, when or to what extent the Rainbow discovery and other future oil and gas activity in this area will affect Peace River. But with the expected increase in exploration and drilling activities, Peace River should, I think, expect some growth.

In the Slave Lake and Fort McMurray areas, communities are experiencing faster growth because they are located closer to the producing fields, and the rate of growth in these two cases should be considered an exception rather than the rule. Growth and expansion accompanying future discoveries and development in northern areas will probably proceed more slowly.

The industry's approach to new areas like Rainbow is not what it was five or ten years ago. At that time people moved into a new discovery area quite early in its development and had the twofold job of developing the field and trying to establish a living community at the same time.

However, technological changes within the industry have helped to alter the old pattern. The industry

can now operate at more remote distances quite successfully. For example, wider well spacing results in fewer facilities to operate and maintain, while at the same time permitting more efficient development of reserves and enabling companies to invest larger amounts of money to explore for new reserves.

At the same time, there has been a trend toward automatic operation of production facilities. This change has been made for reasons of improved efficiency and cost reduction. A present-day automatic system eliminates most of the production batteries and crude gathering and treating stations, which dot many oil fields, all of which normally require manual operation. Crude oil can now be treated and shipped from fewer central locations. This one step alone has done much to streamline the industry's field operations, improve costs and reduce the land use problems between our industry and others.

Major improvements have been made in producing technology to recover a greater percentage of the known oil in the ground. Improved recovery methods have the effect of prolonging the life of a field or, alternatively, increasing a field's capability to produce at a faster rate. These improvements have also created a need for more sophisticated equipment and technology.

Changes are also occurring in the exploration end of the business which we hope will improve our finding rate, contribute to lower finding costs, and result in fewer dry holes. Among these I might mention the adaptation of electronic computer processes to geological studies and to the interpretation of geophysical data.

Incidentally, the effect of these changes is to raise the industry to a higher level of scientific and engineering performance which, in turn, exerts a stronger influence on both the quantity and quality of the people the industry employs and the type of person it looks to for supplying its needs.

Not only is the industry employing a greater number of engineers, geologists, geophysicists, accountants and other professional people but it is demanding higher qualifications from all potential employees.

With today's advanced techniques, there is an ever-growing requirement for technically trained people to design, operate and service the systems and equipment being used.

This, of course, throws an increasing burden on our educational facilities which already are hard-pressed to meet the swelling demand of our knowledge-seeking youth.

Field development is the most active stage of oil and gas operations. Drilling activity is at a high level and demands for equipment, supplies, and services reach a peak. The oil and gas industry historically has spent about one million dollars a day in Canada for goods and services but total expenditures are considerably higher. Last year in Alberta alone expenditures amounted to more than \$621 million exclusive of pipeline investment—or about equal to Canada's share of the St. Lawrence seaway—and expenditures at approximately this level are expected to continue in the foreseeable future.

Many segments of the economy benefit from the industry's spending since the oil and gas industry tends to rely on independent businesses to provide much of the services and supplies it requires. The operating companies employ about 12,000 people which is about 2½ per cent of the Alberta labor force. However, it is estimated that the industry, through the various demands it creates, supports over 100,000 persons, including the families of the industry personnel.

The secondary effect of oil industry spending leads to the addition of workers in nearly every type of business and industry. It is felt in manufacturing, wholesaling, retailing, in the financial community and the areas of professional services.

It is impossible for me to say what the future investment possibilities will be in northern Alberta as a direct result of oil and gas industry activity. I can only tell you what the industry is doing, what it hopes to do and some of the methods it will use.

The oil and gas industry is aggressively searching all frontiers for new reserves and new production. It is bringing to the job the latest technology and techniques gained from experience accumulated in other parts of Canada and the world. The industry is learning better ways to operate in remote regions with fewer people, and those it does employ grow in skills and training. Our industry welcomes new ideas and is usually quick to embrace any that prove successful.

Exploration methods are going through a continuing process of refinement and sharpening, helped by computers and other available aids. Coupled with increasing geological knowledge the industry will continue to search for better and more economical ways to meet its objectives.

Northern Alberta, with its recent new discoveries, is now undergoing intense evaluation by the oil and gas industry and I am confident that many undiscovered oil and gas fields await their opportunity to add to the economic development of Alberta.



W. D. C. MACKENZIE

W. D. C. Mackenzie, manager of Imperial's western producing region, was born in Macleod, Alta. He graduated from the University of Alberta in mining engineering in 1935 and the next year joined Imperial's geological department at Calgary.

He worked on surface geological surveys, took post-graduate work in geology at the University of Chicago and in 1937 headed up the sub-surface geological work at Turner Valley. Later he transferred to the petroleum engineering department there.

During the war Mr. Mackenzie helped develop the Norman Wells field in the Northwest Territories as part of the Canol project to supply defense forces in Alaska. When this assignment ended in 1945 he spent several months in New York and then went to Toronto as chief engineer of Imperial's producing department. In 1948 he returned to Calgary as assistant manager of western producing, becoming manager in 1951.

SUMMARY

presented by

W. D. C. MACKENZIE

Panel Moderator

MR. Richards has shown us a current picture of great promise, and great prospects, backed up by some almost spectacular discoveries. It would be hard to imagine a more exciting situation—the slang version is certainly “everything is coming up roses”. However, Mr. Richards wound up on a note of sober reflection—which I think is of great importance and great significance. The great success of today is not the result of a few brilliant technical breakthroughs—in an untouched and unscratched area. Also, it was not success from a very few wild gambles made. Luck and science do play their part, but the mixture of the two has changed much in recent years. In the modern oil and gas business, scientific assessment of potential of a large volume of sediments is usually pretty good in the gross sense—in the detail of time and place, luck continues to play its part—expressed another way, the potential assessment is proved by actual discoveries, sometimes they come early by good fortune, sometimes they come late by misfortune. In some instances the discoveries are made in the areas that are initially explored—in other cases misfortune may push them into unexpected adjoining areas. So as I mentioned, a moment ago, luck does have a bearing on the details of time and place, but there is very little luck involved in the basic scientific assessment. But remember Mr. Richards' emphasis that the basic knowledge requires skill, work and money—all in large quantities. So we must conclude from Mr. Richards' figures and remarks that years of industry effort went into the acquisition of basic geologic knowledge in Northern Alberta prior to the banner years of 1964 and 1965. Today's success would be impossible without this early work. So the secret to success is **sustained exploration** despite periods of frustration and disappointment. His graph on investment and returns is the best illustration. Mr. Richards has told you that sustained exploration is dependent on three things—may I in my own fashion repeat them—

1. A favourable investment climate for risk capital
2. A good potential profit opportunity
3. A good fundamental geologic setting.

Mr. Richards showed us the significant long-term trends in spending and he also rationalized some of the short term changes. In this latter connection he showed us where as market possibilities picked up, so did exploration drilling; and, as the outlook waned exploration wells declined. The remarks of his that I refer to concerned gas prospects and possible gas markets.

Now, turning to Mr. Blexrud's presentation and his description of our industry mainly aimed at significant factors that will have great future influences on achievements in Northern Alberta.

1. Mr. Blexrud referred to the impact of development of the new Northern Alberta discoveries on Northern Alberta communities. Mr. Blexrud indicated that after development a very few people are needed to operate and produce a new oil field, and for that matter only a few people are needed for a whole chain of oilfields. Expressed another way, it seems doubtful if we will ever again see oilfield towns like Turner Valley, Devon, Drayton Valley and Swan Hills.
2. However, while manpower per unit of production shrinks, certainly communications per unit of production gets more sophisticated, gets wider in scope, gets more important. Thus modern production techniques are greatly dependent on good roads, airplanes, airports, radios, pipelines, telephones, micro-waves, etc. The incentives are there to rapidly advance communications and transportation.
3. While Mr. Blexrud emphasized that the operating companies do not employ a large labour force,

it is pertinent to note that the oil and gas industry has not tended to provide all its own service functions—rather it has preferred to contract maintenance repair, and quite a few other types of work. Thus within the total exploration and production phase there is usually a large independent service industry; I can think of many examples—drilling, site clearing, trail clearing, geophysics, instrument control repair, well clean out rigs, pump and motor maintenance, pressure surveys and a host of others. This service industry can be an important addition to some communities.

4. Mr. Blexrud gave considerable emphasis to the part played by new technology in exploration and production. Also he inferred that this is a technology that is expanding every month every year—we could say it is the impact of “on-rushing technology”. Thus there is a great demand for

qualified skilled people even although the total work force in our industry is not very large. Some economists have said we are a capital oriented industry, not labour oriented. Really Mr. Blexrud has said that the sophistication of the capital equipment is very important to understanding our industry. Mr. Blexrud gave us a fairly extensive and well documented presentation of this one facet—and rightly so. I have racked my brains on how to re-emphasize in the few minutes that remain to me. Knowing that Mr. Richards had intended to use a Vu-graph, I suddenly remembered where to put my hands on a tabulation that gives an excellent comparison.

Well ladies and gentlemen, that completes the presentation of the panel—we hope we have created some interest in an industry whose constant companion is change—the theme of the conference.



L. J. CRAMPON

L. J. Crampon joined the staff of the Southern California Laboratories of the Stanford Research Institute in 1964 as an Economist, to specialize in the field of recreation and pleasure travel research. Prior to that he had been Director of Bureau of Business Research and Associate Professor of Business Research at the University of Colorado since 1946. A graduate of Drake, Washington State, Indiana and Colorado Universities, Mr. Crampon is widely known as an author and speaker in the fields of tourism research, recreation and business research.

NORTHERN ALBERTA'S TOURIST POTENTIAL

presented by

L. J. CRAMPON

Recreation Economics Research, Stanford Research Institute, South Pasadena, California

HANK you for permitting me to share these important days with you. In the days to come, I shall be watching the developments in the land of the mighty Peace. As business expands, as employment increases, and as the population grows, I shall, with great pride, be telling my friends that I was there at the conference where so much began.

Although I have visited many parts of your country—from the Straits of Juan de Fuca to the Bay of Fundy—and during the last few days have been shown the great land of the Peace, I do not claim to be an expert on Canada. Instead I come to present for your consideration some suggestions concerning one important phase of your economic development program.

Yesterday at the luncheon, Mr. R. H. Laidman of Pacific Western Airlines suggested that the tourist industry held a great potential for the Peace River Country. My hope is that I may present some ideas concerning a program to attract more tourists and tourist dollars to this area.

Background

We need some background on tourism in Northern Alberta to set the stage for the development program I wish to present. Permit me to present a few facts relative to the present Northern Alberta tourist market.

1. Between 90,000 and 100,000 visitors came to the Peace River area last year. This figure may appear to be small when compared with the total number visiting the province, but it is as many visitors as arrived in Hawaii in 1954. Let me repeat: Northern Alberta, in 1964, attracted as many visitors as did Hawaii in 1954. However, in 1964 more than 400,000 visitors arrived in Hawaii. The land of the Peace can experience a similar growth by 1975. Hawaii, I might add, is planning for 1 million visitors in 1975.

2. Visitors do not stay long in Northern Alberta. As compared with an average stay of about six days for visitors in Alberta, the average stay for visitors in Northern Alberta is only about two days. The result is that the average tourist party spends approximately \$150 while visiting Alberta; the average party spends less than \$50 while visiting Northern Alberta. Were we to increase the stay of the average visitor to Northern Alberta by only one day, the total annual tourist expenditures in this area would increase from about \$1.6 million per year to approximately \$2.4 million. Here exists an opportunity.

A Tourist Development Program for the Peace River Area

You have a tourist potential. If there be any who doubt this, let me tell you a story that should eliminate any questions. Come with me to the Great Plains and the town of Minden, Nebraska—slightly smaller than Peace River. Minden is a farm town. Summers are warm, indeed hot. Would anyone on a vacation stop in Minden? The answer is "yes".

It began shortly after World War II, when Harold Warp began building a memorial to his parents and other American pioneers. In 1953, his Pioneer Village in Minden was opened. But the story does not end there. His museum—that began with a two-block area—now covers 20 acres and houses 30,000 historic items in 22 buildings. At the same time, Warp erected highway signs, many of them, to encourage travelers to drive to Minden and visit the Pioneer Village.

Currently more than 125,000 visitors a year pay to visit the Pioneer Village in Minden. That this is a "paid attraction" is not the point. Motels, restaurants, gasoline stations, and other stores and shops have been developed. Business in Minden prospers. Here tourism

contributes significantly to the economy of a small farm town. What was done in Minden can be done here.

I could tell other stories. There is Dodge City, Kansas—about the same size as Grande Prairie. In Dodge, old Front Street of the frontier days has been rebuilt, the Long Branch Saloon reopened. Nearby is Boot Hill, the graveyard in which heroes and villains of the past were laid to rest. Nearly a half million people visit the Boot Hill cemetery each year and spend money in Dodge City. I could also mention the 100,000 visitors who stop to see the House of Yesterday at Hastings, Nebraska, or the 200,000 who annually visit the Dwight Eisenhower Museum at Abilene, Kansas, or the same number who are attracted by the Harry S. Truman Library at Independence, Missouri. Then there is the Boy Scout meeting room at La Junta on the plains of eastern Colorado. The Boy Scout room is unique, built as a replica of an Indian kiva, and visited each summer by more than 100,000 visitors who spend money in La Junta.

There is no doubt: tourism can be developed in an agricultural area. If it was possible in Minden, Dodge City, Hastings, Abilene, Independence, and La Junta, it can be done here. So permit me to continue and suggest a four-step tourist development program:

1. Know what you want to accomplish
2. Know your potential markets
3. Develop your resources
4. Promote and sell.

To explain these four steps we shall again visit some successful tourist destination areas. Here we shall find what has produced success; here we can obtain ideas that can be adapted for use in the land of the Peace.

1. Know what you want to accomplish

A tourist development program is a type of economic development program. The goal of an economic development program is to increase business and employment opportunities. Never lose sight of the fact that the objective of tourist development is, likewise, to create more business and more jobs. You seek to attract tourists as you seek to attract new industry in order to increase business and employment opportunities. Let me illustrate.

Bar Harbor (population about 4,000), located on Mt. Desert Island on the rock-bound coast of Maine, has long been a popular resort area. Located also on Mt. Desert Island is the Acadia National Park, an area visited annually by more than 1.7 million persons. The Bar Harbor Chamber of Commerce recognizes that not all visitors provide the same number of jobs or business opportunities. Despite the two free public national park campgrounds, with a total of approximately 600 campsites, the Chamber of Commerce feels that its interest is not in the lower-spending families seeking such accommodations. Instead, being businessmen, they recognize and openly admit that they seek those tourists who will be able and willing to spend sizable sums of money in their area—the tourists that will provide employment and business opportunities. The developments and facilities as well as the promo-

tion is, therefore, addressed to the types of tourists that they know will spend money.

Tourism must be approached from a practical, business viewpoint. Frequently it is not. Never forget the objective that goes beyond the attraction of visitors, that goes to the creation of employment and business opportunities. Never forget that one tourist staying two days may contribute as much as two tourists each staying one day.

2. Know your potential markets

You should also know—or discover—where your potential markets exist and what these potential visitors desire. Two stories, one about a man and the other about an area, will illustrate.

The man is Harold S. Smith, Sr. Although I recognize that Mr. Smith's operation might be frowned upon by the government of Alberta, I do want to tell you his story. By so doing I am not advocating legalized gambling, but I am advocating Mr. Smith's approach to a business problem. In the early 1940s, Mr. Smith opened what he called a "shop" on Virginia Street in Reno. His only attraction was a wheel of fortune—a gambling device. The personnel of his shop included himself, his wife, and his father. It was a small family business operating under the name of Harold's Club. Today, twenty-five years later, he employs 1,125 persons in what is recognized as the world's largest gambling casino. How he accomplished this can probably best be expressed in Harold Smith's own words. "Even a child knows that you cannot sell the American public what they do not want." Based on this principle, Harold's Club was built; he has given the public what it wanted. Had Harold Smith believed that his market wanted to see Eskimos and igloos in Reno rather than one-armed bandits and roulette tables, he probably would have built an igloo and imported an Eskimo family.

Let me deviate and make two suggestions. First, get a copy of the book written by Harold Smith, Sr., **How to Quit Winners**. Though it may not tell you how to quit winners while playing poker, it will tell you how to quit winners in the tourist industry. Second, get and study the reports dealing with the wants and desires of the travelling public. Study the reports from your provincial tourist department. And get from the Outdoor Recreation Resources Review Commission in Washington a copy of Report Number 19. This will give you a wealth of information concerning the outdoor recreation desires of the American public, comparing, for example, the relative popularity of fishing, hunting, picnicking, driving for pleasure, and many other activities.

My next story concerns an area down in Missouri. The site is the Lake of the Ozarks, a man-made lake formed by Bagnell Dam, constructed by a private utility. Near the dam is the town of Lake Ozark with a population about equal to that of High Prairie. The total population of the entire area is about 10,000. To promote tourism, the local businessmen organized the Lake of the Ozarks Association to supplement Missouri's annual \$½ million state advertising budget. Despite the fact that the area has a small population,

the Association has an annual advertising budget in excess of \$60,000. More important, they recognize that these dollars must be spent wisely to produce the most effective results. Therefore, they have found it advantageous to identify their potential market so that their advertising can be directed to it.

Back in 1957, the U.S. Bureau of the Census—our D.B.S.—undertook a national travel survey (updated in 1963). Many have seen this survey and have found it interesting. The Lake of the Ozarks Association, however, put it to work. The study revealed that 38 percent of all U.S. vacation and pleasure trips were to a destination less than 100 miles from the residence of the visitor and that 88 percent of the vacation and pleasure is concentrated within a radius of 500 miles. A circle with a radius of 500 miles was drawn on a map with the Lake of the Ozarks at the centre. Then the Association concentrated its promotion on people who live in this area—people who can and might vacation at the Lake of the Ozarks. Was it successful? You judge. It is hot and humid during the summer at Lake of the Ozarks, but the Lake of the Ozarks attracts several times as many visitors as does Banff.

Various studies of the travel industry lead to the generalization that the primary tourist market of the Peace River country is at your back door. Probably one-third of your potential visitors are living in Edmonton, Calgary, and Southern Alberta. You can learn much about the location of your potential markets by a careful study of the **1964 Travel Survey** published by the Alberta Government Travel Bureau.

3. Develop your resources

After you know what you want to accomplish and after you know your potential markets, it is time to consider your resources. Resource development is an important part of the program. May I tell you what several other areas have done.

For our first success story we go to a depressed area, an Indian community in the Great Smoky Mountains of North Carolina, the town of Cherokee. The people of this farm area formed the Western North Carolina Associated Communities to “develop the economic potential” and improve the level of living. An inventory of the assets was made, much like the one Robert N. Harvey has made for you. They, too, decided that tourist development offered a possibility; but they also recognized that, despite their mountain location, Cherokee probably lacked sufficient reasons to attract a large number of visitors. Mountains, they knew, were common features along the eastern seaboard, stretching from Georgia to Maine and on into Quebec, just as beautiful farm country is common to an area stretching from the Texas Gulf Coast to near the Northwest Territories.

In order to lure tourists to their mountains, the residents of Cherokee knew it would be necessary to add something extra to what they had to offer. They decided to present a drama telling the story of the Cherokee Indian and the removal of their people from their homeland in the mountains to the plains of Oklahoma. But they knew that this drama must be of top quality. Therefore, they employed professional writers

to prepare the script of the drama that was soon to open under the title of “Unto These Hills”. Likewise, they recognized the necessity of top quality in the production itself. Despite the fact that the local people enjoyed acting, they imported professional actors to play the leading roles. In 1950, the first drama was presented. Since that time performances have been presented each night during the summer season, about 70 each year. Through the current season, the total paid admissions to “Unto These Hills” has exceeded 2 million. The profits from the drama have been pumped back into the community to build a larger theatre that now seats 3,000 and to build other attractions that will keep people in Cherokee.

Has the program been successful? In Cherokee today there are more than 125 firms in the tourist business, providing more than 450 jobs. When compared with the total labor force of about 1,500, this is significant. The per capita income of the area has increased from 50 percent to 80 percent of the U.S. average. The secret of Cherokee’s success has been the differentiation of their area to provide a specific reason to visit this community to find fun and enjoyment.

To further illustrate the importance of providing a special reason for visiting a specific area or, as the economists say, product differentiation, come to the Black Hills of South Dakota. Here we find a mountainous area successfully competing with nearby areas that have much higher mountains. True, South Dakota advertises her Black Hills as the “highest mountains east of the Rockies”, but in terms of Western America’s standards they are low; in fact, they are among the lowest mountains west of the Mississippi—far lower than the majestic hills of Colorado, Wyoming, Montana, or Alberta. This disadvantage was not to stop the men of South Dakota. Possibly someone in some past year asked: “Why should anyone visit our Black Hills when they could see the Rockies?” They were selling mountain scenery in direct competition with areas immediately to the west. They recognized that to achieve success they would have to offer the South Dakota visitor an opportunity for an enjoyable experience not available elsewhere.

This story goes back many years. Someone had an idea—to carve the faces of three South Dakota pioneers upon a mountain. In other words, they would carve the face of the counterpart of Twelve Foot Davis. But another suggested that the pioneers be replaced by great Americans. The latter, being more meaningful to out-of-state people, would undoubtedly produce more visitors. So the carving of Mount Rushmore began—with Washington, Lincoln, and Jefferson. Roosevelt was added later. Now South Dakota had something different, something unique. Their sales story is that you can enjoy mountains in both South Dakota and Alberta, but you can only enjoy mountain plus Mount Rushmore in South Dakota.

Was this successful? The memorial cost about \$1 million to carve. Through 1965 nearly 20 million people have visited Mount Rushmore and incidentally spent money in the Black Hills. This million-dollar investment, bringing 20 million visitors, means that it has cost about 5c per visitor, and Mount Rushmore will

continue to attract millions of visitors and dollars to South Dakota. Need I say more?

The same is needed in the land of the Peace. Your great natural assets provide a magnificent backdrop for tourist development; nevertheless, something different is needed, something that the visitor must come to Northern Alberta to see and enjoy. I believe that you have the base for this "something unique" that you can develop. This conference, itself, suggests a theme that could bring many people into this land — "The Changing Frontier". Would not the tourists who flock to replicas and restorations of the frontier in other areas come to see the frontier itself? The story would have to be told, dramatized. But the making of a unique attraction is in your frontier. In keeping with the Changing Frontier theme, I would like to offer a few specific suggestions.

A drama of the frontier. One community in the Peace could follow the idea of Cherokee and present a drama telling the story of what Premier Manning identified as North America's last frontier.

A frontier museum. Another community could build a museum, differing from the typical, pioneer museum in that it would display the story of the developing frontier up to the present. The museum could include displays of the early settlers, plus a dramatization of current frontier history.

A frontier fair. Still another community could stage a frontier fair, specializing in handicraft and other local items. Typical frontier entertainment would be provided.

Historic areas. At sites such as Dunvegan, old settlements could be restored or rebuilt to dramatize the early settlement. A visitor center to tell the story would add enjoyment for the visitor.

Expeditions to the frontier of the north. Air and surface trips from this area into the far north—the Northwest Territories — could be planned much as the Canadian National Railway runs special trips from Winnipeg to Hudson Bay.

These are but a few suggestions that might be used to develop unique frontier-oriented attractions.

But there is still another important phase of resource development. Never underestimate the importance of the human resources. To illustrate, we go to Hawaii. Last year visitors spent \$175 million in the Islands. Why do people visit Hawaii? Come with me to discover the secret of this success.

As our ship rounds Diamond Head, and Waikiki comes into view, we cannot help but notice the catamarans and the tugboats that are making their way to greet us. As tugs loaded with people come alongside our ship, people scramble aboard with armloads of orchid leis. They have but one purpose in mind—to say "Aloha, welcome to Hawaii". It is wonderful to know that people thing enough of you to go out of their way to say "Welcome". As our ship docks, we are greeted by the Royal Hawaiian Band, again saying "Aloha". At our hotel we are greeted, in our room, by a bouquet of exotic tropical flowers or tasty tropical fruit, the

management's way of saying "Aloha". This, you say, is well and good in a large city such as Honolulu, but impossible in a small town. Will you come to a neighbor island? Let's stop at the small community of Kailua, on the Kona Coast of the big island of Hawaii. Kailua is about the same size as Grimshaw. As we deplane at the airport, a large Hawaiian comes forth to say "Aloha", dressed in the costume of the alii nui, or royalty of old Hawaii — a yellow-feathered robe trimmed in red and a yellow-feathered helmet — and barefoot, as his ancestors had been a hundred years ago. He comes to extend the greetings of the people of Kona.

"Aloha" is an interesting word, used frequently in Hawaii. It is used when two people meet and again when they part. It is used in place of our "hello" when answering the telephone. It can be used as you sit at a bar and raise a drink. Or it might be used by the Hawaiian boy as he looks into the dark eyes of the little brown girl as they sit on the beach in the moonlight. The literal translation of the word "aloha" simply means "I love you". This is the greeting of Hawaii; this is the message that the Hawaiian people use when you first arrive in the Islands. The spirit of aloha is basic to the treatment of the visitor during the entire stay—and basic to the success of the tourist industry.

The reason for the great popularity of Hawaii is not the swaying palms or the pounding sea, the beautiful flowers or the tropical fruits, instead it is the people and the friendly atmosphere — the fact that these people do all that is possible to make your stay in Hawaii enjoyable. They have in Hawaii an "Aloha Code", or a statement of the Hawaiian way of hospitality, distributed to those who come into direct contact with the visitors. The Aloha Code significantly begins with the statement "I will treat our visitors to Hawaii as I would a personal guest in my own home" and ends by emphasizing that "service is our most important product".

You, too, need an "Aloha Code". You must do everything possible to make the visitor's stay enjoyable. This can not be left to chance. Successful areas frequently sponsor hospitality clinics to show those who come into contact with the visitor the importance of a friendly atmosphere. All tourist areas need hospitality clinics. None can assume that the visitors will receive the proper treatment.

4. Promote and sell

The final step is to promote and sell. The most common error is to promote before the area is ready for visitors. But sell you must. However, remember what the potential visitor wants to buy. This and only this can you sell.

The potential visitor is seeking fun and enjoyment that can be obtained by means of a visit to the Peace River country. The visitor is undoubtedly interested in the area, not an individual town. As you buy a whole automobile rather than individual parts (a carburetor, a distributor, a battery, and a set of tires), you buy an enjoyable experience available from the various attractions at the areas' numerous communities. It is the land of the mighty Peace that will attract. If this be

true, play down the promotion of the individual towns and emphasize the area. The tourist wants to buy a package—a visit to an area—just as he wants to buy a complete automobile and not the individual parts. Rather than individual town brochures, I would strongly urge the development of an area sales brochure to promote the changing frontier of the land of the Peace. Individual cities and towns should use the area brochure, supplemented by an inexpensive fact sheet on their own city.

The important part of the sales effort is getting the literature to the potential visitor. Plans must be made to get the brochures into the hands of those who might be interested in visiting the area and, equally important, into the hands of those who arrive or happen to be passing through the area. The first—reaching those who might be interested in visiting the area — requires promotion that will reach potential visitors in their homes wherever they might be. Local media—newspapers, radio, and so forth—can be used in your Edmonton or Calgary markets to produce inquiries or requests for information or a brochure. A beautiful brochure is useless unless it can be placed in the hands of prospective visitors.

The visitor should also be given an opportunity to learn about the land of the Peace after he arrives. Many areas operate tourist information booths and distribute large quantities of printed materials to the visitors. The State of Texas operates tourist information booths or

welcome stations for the visitors on seven principal highways at their entrances to Texas, plus one in the state capital in Austin. These eight stations will serve more than ½ million visitors this year.

Such a program costs money — considerable money. Is it worth the cost? The head of the Texas Information Division estimates that the suggestions and help given by the staffs of these stations is increasing the stay of the visitors served by approximately 10 percent. If an area station located, say, at Valleyview served 5,000 parties and, as in the case of Texas, increased the expenditures of these parties by 10 percent, it would add \$25,000 per year to the income from tourism.

Summary

Let me briefly repeat. Your program should have four steps: (1) know what you want to accomplish; (2) know your potential markets; (3) develop your resources; and (4) promote and sell. These steps should be taken in that order.

Will it be successful? From what I have seen and learned about your land and your people, I am confident that tourism offers you a true potential that can, in the very near future, be realized. Let me summarize with just one sentence: Give others the opportunity that you have given me of enjoying the thrilling experience of seeing the changing "Last Frontier".



G. R. HEFFERNAN

A career in the field of metallurgy which began with graduation from the University of Toronto led to the founding, in 1954, of Premier Steel Mills Ltd., by Gerald Heffernan. A native of Edmonton, Mr. Heffernan did post-graduate work at the University of British Columbia, and, following service with the Royal Canadian Engineers, joined the staff of Westland Iron and Steel Foundries, where he became assistant general manager. In 1948, he became Superintendent of Western Canada Steel, and later became General Superintendent. He held the positions of Managing Director, Secretary and Vice-President of Premier Steel until the take-over in 1962, and now is President of Peace River Mining and Smelting Ltd., vice-president of Northwest Explorers Ltd., a company engaged in the search for minerals, and president of Lake Ontario Steel Co. Ltd.

THE DEVELOPMENT OF THE CLEAR HILLS IRON ORE DEPOSITS and ITS IMPACT ON NORTHERN ALBERTA

presented by

G. R. HEFFERNAN

I WOULD like to tell you what we have done, give you some background of this Clear Hills deposit and get out my crystal ball and do a little bit of optimistic crystal ball gazing as to what might happen in the future at this deposit.

The deposit, as you have probably read, is very extensive. We have proven in detailed drilling about 225 million tons of ore grading 33% - 34% Fe. This is not high grade material but, on the other hand, it is very comparable with the grade of the Labrador ore. It is higher than the taconites which are now being processed in the United States and it is much higher than the North Hants ore in England upon which much of the British fuel industry is based. It is about the same grade as the Alabama-oolitic ores and very similar in composition to the Alabama-oolites upon which the whole southern U. S. steel industry is based. It is about equivalent to the Salzgitter ores in Germany on which a portion of the steel industry is based, and it is equivalent in analysis and composition to the minette ores which form the basis of much of French industry. It is not comparable to the very high grade Venezuelan, Brazilian, Australian and Liberian deposits.

Background on this development started back about 1956 when we were just nicely under way with Premier Steel Mills in Edmonton. We decided that, as a long term project, we should try to develop a source of raw material other than steel scrap because we had confidence in the growth of markets in Alberta, and we knew that sooner or later we would be stopped in our growth by the availability of steel scrap. This led us to engage Dr. Black, a geologist who was given some very broad terms of reference. We just said, "Jim, go out and have a look at everything within a 400-500 mile radius of Edmonton and see if you can come up

with an iron ore deposit that might have some potential for the future."

Jim spent about a year at this work and came back to us and said, "Well, the only thing that looks worthwhile are these deposits up in the Clear Hills which had been found some years before. Not much is known about them, but having looked around their geologic references, there is a pretty big deposit there. And, furthermore, I think that we might find all of that deposit under relatively low overburden."

As a result of Jim's recommendations we set up a budget and proceeded to do a methodical investigation of the Clear Hills deposit which resulted in the present situation where we have about 225 million tons proven, another 450 million tons in the category of probably proven ore for step-out drillings and the geological estimates run all the way up to 3 billion tons. So it is a very large deposit indeed, one which could supply the requirements of western Canada for 200-300 years without any difficulty at all.

One of the other things that attracted us too was the availability of cheap natural gas. While, at the time that we did our development work and exploration, there really didn't appear to be any feasible way of handling this ore (it was not a standard ore that would fit any of the normal metallurgical processes) we felt that the combination of low-cost fuel and low-cost iron units just had to lead to something, and began a research program to find out just how to do it. We investigated all of the standard technics of concentration, magnetic roasting, grinding, separation, and so on. We did a very extensive program on a process known as the RN Process which actually was quite successful. We produced about 1,000 tons of iron briquettes which run in excess of 90% metallic Fe. This made quite a suit-

able and desirable melting stock for electric furnaces, for open-heart charge material or for LB Converters. However, the nature of this process required a very, very large market. We did quite a lot of work in Japan on trying to develop such a market but unfortunately, just after we completed all of our technical tests in Japan and had convinced the Japanese that this was a product they wanted (we were talking a price of about \$50.00 c.n.f. Japan and had sent several hundred tons of briquettes to Japan at great cost) the price of steel scrap, which, for the previous ten years had held up at a level of \$55.00 to \$60.00 c.n.f. Japan, dropped to \$38.00 right in the midst of our negotiations. Fortunately we had, ahead of time, started another research program on another technique which potentially could lead to a small scale development and one particularly aimed at the Alberta market and at some of the specialized U.S. and Canadian markets. This process got under way through the activities of Dr. Gravenor of the Research Council of Alberta.

The first step in the process involves partial reduction of the iron ore with coal or coke. This step is not absolutely necessary. As a matter of fact, we can recycle some of the finished product and eliminate this particular stage and this is one of the things that we hope to work out in our present pilot plant operation in Edmonton. It is now under development.

The second stage is dissolving the iron material in hydrochloric acid. The material is then filtered and washed and the residue on the filters thrown away. This leaves us with the mixture of chlorides in solution: iron chloride, calcium chloride, aluminum chloride, a little bit of vanadium chloride, and some phosphorus in solution. The sulfur has, at this point, gone off as hydrogen sulfide gas and the arsenic in the ore has gone off as arsene, another gas. This mess of chlorides is then put in an evaporator and, through selective crystallization, we obtain pure iron chloride crystals ($\text{FeCl}_2 \cdot 4 \text{H}_2\text{O}$). These crystals can be made to a very high degree of purity, up to about 99.9% pure.

After we have filtered off the ferrous chloride crystals, we still have some solution left and this solution contains all the soluble chlorides which have been formed. In order to recover the hydrochloric acid from this, and this is one of the key points in making the whole process economic, we run the hydrochloric acid through a hydrolizing stage in a unit called an Aman Reactor. From this we recover hydrochloric acid which is recycled through the process, through the dissolving stage.

The iron chloride crystals are dried to the $2\text{H}_2\text{O}$ stage ($\text{FeCl}_2 \cdot 2\text{H}_2\text{O}$), the material is then easily compacted into small, easily-handled pellets. The pellets are then fed into a reactor with hydrogen at about 650° Centigrade, which is well below melting temperature, and the hydrogen is passed through them, and we end up with pure iron in the form of little sponge pellets. The pellets are then ground up and conditioned into iron powder and this is one of the products that we market. The same powder can be rolled directly into steel strips.

This is quite a unique approach to steel making. The normal method is, of course, to have a blast fur-

nace into which you put iron ore and you make molten iron, the molten iron is then fed into an open-hearth furnace or into an oxygen convertor and blown to steel, poured into ingot molds, and the ingots are stripped, put in soaking pits, run through very large rolling mills, down into slots or billets. These are scuffed to remove all the scabs and imperfections that occur in standard steel-making practice and then these are rolled into the various end products that you see on the steel market.

The plant we are building is not going to look anything like the normal steel plant. As a matter of fact, it is going to look like and be a chemical plant with no smoke or fumes belching out of it, none of the usual back-breaking jobs that we encounter in the steel industry and none of the unpleasant conditions that are associated with the melting operation of steel making because, in this process, we eliminate the melting operation completely. The plant will be a highly sophisticated petrological unit. The particular process lends itself to continuous operation, and not only that, but to continuous computer control. This means that we will require a very highly skilled labor force and this is in line with what we heard in the Oil and Gas Session this morning where the changes in technology there are requiring a higher and higher proportion of skilled, trained people to operate these units.

The market for iron powder has been growing at a tremendous rate over the past few years. As a matter of fact, its growth rate at the present time is running at 20% per annum in the United States. This year, 1965, the consumption of iron powder in the U.S. is estimated at about 105 thousand tons. Without any major technological changes and with just its present pattern of growth, the industry is expected to reach 200 thousand tons by 1970. However, there are some very major changes going on.

One of these changes is our Peace River development aimed at supplying a low-cost powder. If we are successful in this, in developing a suitable iron powder for the industry in the U.S., this could multiply that growth rate tremendously. One of the large automotive plants manufacturers that we are working with now, for instance, is going into a pilot plant operation which will coincide with ours. This particular part involves a requirement of 60 pounds of iron powder per automobile. Just multiply that by 10 million tons and you get about 300 thousand tons of iron powder for one application. In addition to the present rate of growth of the utilization of powders in the automotive industry, it is estimated that by 1970, if this rate carries on, the automotive industry alone will use 365 thousand tons of powder per year. This is without any of these major breakthroughs that I have been talking about.

Every now and then, in looking at this process, I scratch my head and wonder how it is that we are sitting up here and doing this thing in Peace River and why somebody else somewhere in the world hasn't done it. The fact is that in 1870 a German scientist came up with the idea of producing iron by the iron chloride leeching route with hydrogen reduction. Unfortunately, at that time the technology for hydrochloric utilization was just not there and on top of that, Bessemer came in with the Bessemer convertor about the

same time which completely revolutionized the steel industry in those days.

The things that have lead us to this process are:

- (1) The availability of natural gas which in turn, combined with the higher volume, low-cost methods of producing hydrogen from natural gas which has been developed as part of the space program in the U.S. put hydrogen very much within reach economically for this type of process. That was something that had not been available before, up to until about the last five years.
- (2) Another factor here, of course, is market growth. On projection of growth of such things as Premier Steel and Lake Ontario Steel, while they have appeared extremely optimistic in the feasibility studies, by the time we have gotten into operation we find that these studies don't look nearly as optimistic. On Premier Steel, for instance, we projected that after five years we would be up to 18,000 tons per year. Well, when we sold out to the Steel Company of Canada about seven years after we started up, we were producing at the rate of 70,000 tons per year, about four times our five-year projection. Since then, the production has continued to rise in Premier Steel. In Lake Ontario Steel, we started out with a very optimistic projection that it would be to 200,000 tons by ten years after we started up, which would be 1974. Our sales manager came in the other day with his forecast for the next twelve months and it was 209,000 tons which is 4½% over our designed capacity. This gives you an idea of what is happening in the steel industry. Actually the projections, and these are done by skilled economists, for the growth of steel in Canada over the next fifteen years indicate that our present output of steel of about 10 million tons in Canada will grow to 20 million tons by 1980. Market growth has been a very strong stimulus for the development of the Clear Hills ore deposit.
- (3) Another factor has been growth in powder technology. I have mentioned the possibility of producing parts by powder compaction. The automobile that you drive has something like 100 parts now made by this technique. It has very specific advantages over casting in which you get all sorts of surface problems and internal porosity and so on. It also has advantages over forging because in this your yield is about 100% whereas in forging you normally have a flash and so on which can run up as high as 50%. On top of that, you can make the powder with very clear definition and very accurate tolerances; this eliminates machining and very expensive machining costs.
- (4) One of the other factors that led us down this road was the change in hydrochloric acid technology. Again, this technology is related to a number of things. First of all, the growth in requirements of caustic soda throughout the world and the techniques of making hydrochloric acid by the caustic process. Improvements in the rubber lining of vessels to handle hydrochloric acid, pumps, tanks, and so on; and the development of titanium for

space age applications. It happens that this material is suitable for high temperatures and highly corrosive conditions with hydrochloric acid. Without this particular development in the titanium field, I don't believe that this process would be feasible today.

- (5) Another thing that fell in very nicely with our timing was the development of the Aman Reactor. This was developed in Israel by a Dr. Aman who wanted to find a use for the Dead Sea brines which were by-products of their water purification plant in Israel. He developed this method of extracting hydrochloric acid from this mess of chlorides from the brines and used it for producing phosphoric acid for fertilizer. This particular development was pushed forward by Nordac Ltd. of England who are a firm of chemical engineers specializing in hydrochloric acid processes. This Aman Reactor has already revolutionized the pickling technics in the steel industry throughout the United States and is hitting Europe in a large way. It used to be that everything was sulfuric acid pickling down there and this had problems of waste disposal and so on which you can well imagine. Based on the Aman Reactor, a new pickle system utilizing hydrochloric acid has been developed very successfully and any of the big integrated steel industries that you go into in the U.S. or Canada today, you will probably find them putting in a pickle line based on the Aman Reactor.
- (6) Another factor that has been equally important has been the growth of the transportation system throughout this area of Alberta. We found that, in doing our exploration on the Peace River deposit, it was quite simple for us to drive in there and dig out a few thousand tons of ore, put it on a railway and whip it down for processing and testing. This was very important.
- (7) One of the other big factors has been the Research Council of Alberta. When it was first built people wondered what it would do, but it is a fact, this group have been instrumental in solving many technological problems and have greatly assisted in the development of industry in Alberta.

We expect to be turning things over in February of this coming year in the pilot plant. Some of our equipment is going in now and some of it will probably be tested out before February. We hope to have the whole thing running probably by the end of February or early March.

Based on the results of this pilot operation, and at the present time from the work that we have done we can't see any major technological pitfalls, but there is always that great big "if" facing you on a new project. If we are successful, as we hope to be, we should be able to start our large scale commercial plant design sometime next summer, possibly portions of it a bit before that, and we would hope to be under construction in the spring of 1967.

This original plant will have a capacity, we estimate now, of about 100,000 tons per year. Approximately 50% of that will go into the powder market in

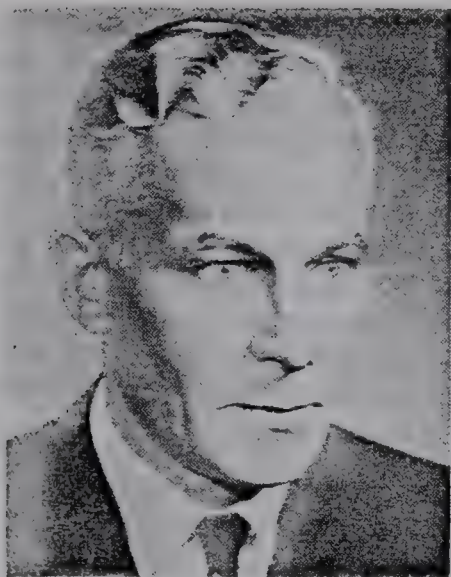
the United States, as we now see it, and the other 50% will go into wide strip for sale in the western provinces of Canada. The wide strip market in 1964 ran about 133,000 tons, as I recall, in the four western provinces. We feel that we can move into that and take a fair portion of it. This is the sort of thing that goes into the body of stoves, refrigerators, washing machines, and all sorts of electrical appliances. It is one of the most common of all types of steel used in the world today. As a matter of fact, about 45% of steel being produced throughout the world today, and I believe it is 400 million tons, about 45% of that is in the form of flat roll products. This is also true of Canada. In other words, we are looking at a Canadian market of something like about four million tons. The figures in the western provinces of 100 odd thousand tons compared with Canadian production of 4 - 4½ million tons gives you some idea of the potential for growth in, particularly I think, the appliance industry in western Canada.

The reason that these things are all made now in the East and shipped in, is not that there isn't sufficient market available out in western Canada to support some of these industries, but rather that the availability of materials is just not here at the present time. I think that as we make this product available, and it looks as though we are going to be able to make it available at very competitive prices, that we will find some of

these industries locating in Alberta and the impact of this on the economy out here will be every bit as large and probably larger than the integrated operation which we hope to put in the Clear Hills.

The effect on this area will be immediate. A large construction project, employing I don't know how many people, and following that, a large scale industrial operation with 300 - 400 highly skilled and highly trained individuals. The proportion of engineers and graduate technicians that will be required for this industry will be very high. In addition to that, we will have to do a lot of training and upgrading of other people in the area to allow them to work in this plant and perform the functions which they will have to perform. The grade potential is practically unlimited. The present world market is around 400 million tons per year and is going to grow to something like 700 million tons by 1980. The Canadian market, of course, is very great.

With the reserves that we have of iron ore and natural gas, I don't see much reason why, over a period of say fifteen years, that this industry couldn't grow to one million tons a year, based upon the growth of the local market and to some extent on exports. Now, when you start talking about figures like that, you are looking at three to four thousand people plus all their back-up, and the back-up aspect of it is very great.



J. C. DALE

President and Director of Canadian Utilities, Limited, John Clapham Dale is also president and director of Northland Utilities, vice-president and director of International Utilities Corporation, Toronto, and a director of Northwestern Utilities Ltd., North West Fidelity Trust Co. Ltd., Canadian Coachways Ltd., and Peace River Mining and Smelting Ltd. A graduate of the University of Alberta, Mr. Dale began with Northwestern Utilities in 1932 and became an engineer with Canadian Utilities Ltd. in 1935. He has remained with the company ever since, with the exception of 1940-45, when he served with the Armed Forces.

ENERGY IN INDUSTRY

presented by

J. C. DALE

President, Canadian Utilities, Limited

IT is an honour to be asked to take part in this Conference with the timely theme, "The Changing Frontier". My topic, "Energy in Industry", deals with an influential factor in effecting the changes taking place in our northwestern frontier.

To many people, particularly those concerned with economic growth and prosperity, the terms energy and industry are synonymous.

A quotation from the 1957 Royal Commission on Canada's Economic Prospects seems appropriate at this time:

"No image of modern industrial man can convey much sense of his economic state and possibilities that does not give a prominent place to those forms of energy on which his power depends. They are the orb and sceptre that more than anything else represent the degree of his sovereignty over nature. Without them there would be little economic difference between him and his forbears during the long centuries when there were only water wheels, windmills and the energy of animals to supplement the strength of his own muscles. But when abundant energy resources are available and techniques are known for transforming them into power, his fortunes can change dramatically."

The Canadian economy, with a labour force about twice as large as that of 50 years ago, better equipment and improved techniques but most significantly, with the help of about five times as much energy, is turning out about six times as many goods and services as it was producing in 1900.

A farmer today, using power-driven machinery, can harvest 30 acres of wheat for every acre he reaped a century ago, using hand tools.

Today, a paper mill operator can turn out 10 times as much newsprint as he could have at the turn of the century, 65 years ago.

It is generally conceded that there is a close relationship between energy use and economic growth. With some exceptions, the most productive countries are those with high per capita usage.

United States, which is reputed to have the highest standard of living in the world, uses more energy per capita than any other country. Energy as used here is that derived from all sources — water power, natural gas, oil, coal and wood, etc. Generally when one thinks of energy and economic well-being it is energy in the form of electric energy. However, electricity provides only 20% of the basic energy needs in the United States. While I haven't the statistical data for other countries, I suspect electricity is an even smaller percentage of total energy use elsewhere.

Canada ranks sixth in the world in total electric production, being exceeded by U.S., U.S.S.R., U.K., Japan and West Germany, in that order.

However, when considering electric production on a per capita basis, Canada ranks second, being exceeded only by Norway.

Before we consider energy in its relationship and importance to industrial development, let's take a brief look at the manufacturing industry itself.

The term manufacturing is all-inclusive and is generally subdivided into primary and secondary manufacturing. Broadly speaking, the differences between primary and secondary lie in:

- a) degree of processing
- b) location of market
- c) source and type of materials used.

The primary industries include those that involve relatively minor processing of domestic raw materials in which the added value due to manufacturing is relatively low, such as flour milling, as well as often complex industries, highly capital-intensive, processing

domestic raw materials for eventual use mainly in export markets, such as pulp and paper making, mining and smelting.

In contrast, "secondary" manufacturing industries are characterized by a high degree of processing, and a much greater dependence on the domestic market. They tend to be located close to the centre of the market and generally produce end products rather than industrial products. The sources of raw materials and components are foreign and domestic suppliers.

When communities, areas, and even chambers of commerce, say, "If we only had more industry, our economic problems would be solved", they are usually thinking of secondary industry. And indeed they are important and beneficial to a community. It is estimated that the addition of 100 manufacturing workers to a community will mean:

- 427 more people
- 131 more householders
- 187 more motor vehicle registrations
- 117 more other workers employed
- 3 more retail outlets

and \$939,000 more annual retail sales.

What is too often overlooked is the factors that are considered by the manufacturer when deciding to locate in a particular area. From a study based on information supplied by 400 industrial plants, the relative importance of various location factors was determined to be:

Factor	% Weight
1. Market -----	18.9
2. Labor -----	14.5
3. Raw materials -----	12.3
4. Transportation -----	7.7
5. Building -----	7.5
6. Distribution -----	7.0
7. Site -----	6.7
8. Living conditions -----	6.2
9. Climate -----	3.9
10. Industrial fuel -----	3.4
11. Financial help -----	2.2
12. Water -----	2.2
13. Taxes -----	2.1
14. Industrial power -----	1.9
15. Laws and regulations -----	1.1
16. Miscellaneous -----	2.4

Of course, these are averages and each industry will have its own ideas as to the relative importance of each factor. It is interesting to note that industrial fuel and power are well down the list in order of importance. This is not surprising when you consider that energy as a cost item in secondary manufacturing averages out around 3%.

Now as to sources of energy that will make their contribution to the economic prosperity of this "changing frontier" under consideration, the first that come to mind are oil and gas.

The petroleum industry which includes refining, extraction and pipeline transportation is capital-intensive, having the second highest dollar investment per employee. Electric utilities have the doubtful distinction of being first. As their growth is dependent on markets,

further exploration and production from fields known and probable in the north is dependent on export, national and foreign. However, the petroleum industry is certainly a factor in pushing back our frontier, if for no reason than that it provides access roads to areas that previously had none. One side benefit of the industry, not generally realized, is that it has greatly aided the extension of the province's electric power grid. Many a farm and hamlet would be without central station power if a producing oilfield had not first provided the economic justification for the extension.

The natural gas fields in this area, so far, do not seem to have had much of an impact on economic growth. However, in conjunction with other raw materials, they could well be the reason for the establishment of industry. For example, the salt plant near Lindberg, the chlorine and caustic soda plant at Duvernay, or the fertilizer plant at Calgary, and Sherritt Gordon at Fort Saskatchewan. As a raw material, natural gas is ideal for the production of ammonia, acetylene and certain other organic chemicals. Its principal products, sulphur and liquids, can similarly be used for processing metals, or in the production of such chemicals as synthetic rubber and plastic.

The cost of transporting energy as petroleum by pipeline is approximately one-third the cost of transporting it in the form of natural gas, and about one-thirty-fifth of the cost of transporting it as electric power by high voltage line.

However, in defence of electric power, it is to be noted it has a much higher conversion efficiency and as it is energy already highly processed it is in a much more desirable form.

Extensive coal deposits occur in and around the Peace River area. Unfortunately, at the present time, they are generally uneconomic. This is a relative condition and is primarily due to the presence of natural gas and oil. This coal will undoubtedly come into its own some time in the future. Perhaps a current project of the Alberta Research Council to use coal as a base for fertilizer will if, or rather when successful, transform it into an active economic asset.

Electric power, a more sophisticated form of energy, is important to industry. It is usually processed from fossil fuels, falling water or hydro and nuclear fission. While important and in some cases essential, it is not as expensive an item as generally thought, amounting on an average for all manufacturing to some 35% of total expenditure on fuel and power, and only 0.8% of gross value of production.

Perhaps a quick look at some of the more exotic methods of generating electricity will be of interest.

Solar cells are very much in the news just now due to their use in space vehicles. Here cost is of no consequence but the high cost per kilowatt produced makes conversion of solar energy into electricity too expensive for most practical applications. Although I have recently noticed ads in the popular magazines for portable transistor sets that have incorporated solar cells in the handle for recharging batteries. Photovoltaic cells at present used in satellites are for the most part silicon cells, although germanium can also be used.

Fuel cells have also become familiar due to their use in space vehicles. The catalytic oxidation of methanol holds the greatest promise as a source of power for fuel cells, with the oxidation of gaseous hydrocarbons coming next. The fuel cells used to power the most recent U.S. two-man satellite operated on hydrogen and oxygen. In addition to power, it also produced water. It struck me that when these chaps go to the moon all they will need to do to celebrate their safe arrival will be to take along some dehydrated scotch!

Geothermal power, while being used in New Zealand, Italy and I believe California and Iceland, is of no interest here as it is dependent on the presence of volcanic heat.

Tidal power is another source of power of no interest inland.

M P D, short for magnetoplasmadynamics, or perhaps better known, as my reference so helpfully remarked, as magnetohydrodynamics, is recognized as a phenomenon with considerable commercial potential. In this device, a plasma of hot ionized gas (1500°C to 3000°C) is blasted at supersonic speeds (3000 to 4000 ft/sec) through a static magnetic field. The induced currents are collected by suitably placed electrodes. One source of heat for this apparatus is the high temperature nuclear reactor.

Nuclear Energy from the Fission Reactor is almost as familiar as the conventional thermal plant. Alberta, however, with its ample supply of fossil fuels, should be one of the last provinces to make use of this method of generating power.

Nuclear Energy from the Fusion Reactor is still a long way in the future. Plasma temperatures are so high that no known material can contain the gas. Experiments are continuing in an attempt to contain the gas within a toroidal (circular) magnetic field.

Until just recently, the main sources of supply of electrical energy for northern Alberta have been small isolated diesel plants. As the load has grown, inter-connecting transmission lines have been built, and generation concentrated in larger and more efficient central plants. With load growth and the availability of sour gas, the gas turbine has become the most economical machine for generating power. Gas turbines such as the two in the plant south of Valleyview, unlike diesels, use sour gas directly without any further processing, which makes it cheaper than processed or sweet gas, and aids in conservation measures, instead of allowing the gas to be flared.

The load growth in the Peace River area of Alberta has been phenomenal. For example, the use per customer in the period 1954 to 1964 increased by 236%. Total generation for the same period increased 690%, while the number of customers went up by 135%. Last year's increase in kilowatt-hours sold was some 24% over 1963. It is estimated that 1965 will be approximately 16% over 1964. How long this will keep up I don't know, but in our long term planning we are estimating an annual increase of 11%. While the percentage load growth figures are impressive, the absolute figures are relatively small. The total demand

in the Peace River area is in the order of 35 megawatts. Compare this with units of 75, 150 and 300 megawatts which are currently being installed in Alberta on the Provincial Grid in central stations located near the major load centres.

For the next few years, unless major industries locate in the northwestern part of the province, it is likely that additional power requirements will be supplied from gas turbines and power imported from the Central Alberta Grid.

Eventually, the Peace River area and northern Alberta will be the site of a major thermal or more likely hydro plant. There are large coal deposits in the south Smoky River area suited for use as fuel for a thermal plant and also as a source of supply of coking coal.

There are eight possible hydro sites on the Smoky River from Kakwa to Watino. Rough comparative estimates have been made as to the cost of developing each site and its probable capacity. The head of water varies from about 150 feet for the lowest to 500 feet for the highest, with estimated installed capacity ranging from 60 megawatts to 620 megawatts. Unfortunately, none of these sites are economically feasible in the light of current power requirements. A large industrial load with an unusually high load factor, located close to one of the sites, could conceivably justify building a plant.

Feasibility studies have been completed on the most likely sites on the Smoky to determine their economics and practicability. While this study confirmed a previous high cost estimate, it also indicated there are no insurmountable engineering problems.

The reports are filed away waiting for a customer that needs some 250 megawatts of power at about a 90% load factor.

While of little practical value and of academic interest only, the power potential of all eight sites on the Smoky River amounts to over 2,000 megawatts.

I'm sure, in light of the power development at Hudson Hope, everyone is wondering about power from the Peace River. The difficulty with the Peace River in Alberta is one of foundations. The banks of the river are prone to slump and make the construction of a dam hazardous and expensive. Suitable sites for a dam and power house appear few and far between. However, the appropriate Provincial Departments, in co-operation with the utility companies, are conducting investigations to determine the most likely sites for future development.

While not entirely in the area we are considering, but at least partly and also adjacent, we have the Athabasca River. It is estimated there is some 2,000,000 HP of hydro capacity on this river, from a point near the Town of Athabasca to Fort McMurray.

Further north, on the Slave River between Fitzgerald and the Alberta-Northwest Territories boundary, there is potential of 1,000,000 HP.

It will be seen that there is a tremendous reservoir of energy in northern Alberta, just waiting for the right economic climate for development.

At this point, I would like to quote again from the Gordon Report:

"Country by country data confirm this thesis—namely, that to be a producer is, doubtless, useful; to be an effective consumer of energy is far more important insofar as the process of creating wealth is concerned. From this it follows that Canada, while it will benefit from the search for and development of its energy resources, will be even better if a growing proportion of its supply of oil, coal, gas and hydro-electricity can be put to work at home."

I think one of the objectives of this Conference is to do just that. That is, encourage industry and manufacturing to move in and make use of our natural resources. To be successful, a continuing effort is required, and where better than from the areas and individuals most directly concerned?

Most communities have an organization dedicated to the pursuit of prosperity. The energy and enthusiasm of most of these groups is amazing. Of course you will find the odd one content to pass resolutions deploring the lack of industry or resolving that "we must induce more industry to locate here", and letting it go at that.

It doesn't seem to be generally known, but the Provincial Government's Department of Industry and Development, your bank and other financial institutions, and just recently your local power utility, have departments available to help community industrial

development committees. They can't do the work for you, but they can certainly save time and energy by indicating procedures and methods that have been successful elsewhere.

In conclusion, our northern area is just entering into a period of accelerated growth. Its natural resources lend themselves to the development of both primary and secondary industry. There are ample supplies of energy so necessary to this development.

With the recent changes and improvements in communications and transportation, development and marketing are becoming more economical, resulting in an improvement in the competitive position.

All that is needed is an imaginative, industrious and energetic population, and I think there is no worry on this score.

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Energy—International

Electrical News and Engineering

Engineering Digest



G. R. GRAHAM

G. R. Graham, Vice-President of the Mountain Region, Canadian National Railways, was born in Schreiber, Ontario, and has been in the service of the CNR since 1922, when he began as a bridgeman. He has served as roadmaster, assistant superintendent, superintendent, general superintendent, and, since 1961, as vice-president, Mountain Region. He is a director of the Alberta and Northwest Chamber of Mines; a member of the advisory committee of the Faculty of Commerce, University of Alberta; advisory board, Edmonton Chamber of Commerce; and belongs to the Alaska State Chamber of Commerce, the Arctic Club of Seattle, and the Greater Anchorage Chamber of Commerce.

TRANSPORTATION IN THE NORTH

presented by

G. R. GRAHAM

EARLY in February, 1961, I arrived in Peace River with the Honorable Walter Dinsdale to participate in the opening ceremonies for the Construction of the Great Slave Lake Railway. I think many of you Peace River people remember that day. Being Winter, we were unable to turn the first sod, so a bulldozer was used to knock some brush down off the proposed right-of-way. The Honorable Minister was the driver of the cat, I was his assistant and we had an instructor with us to show us how to operate this machine. We did fine going down the right-of-way, but when we turned to come back we went through a farmer's field, a couple of fences, and knocked down a couple of acres of bush. But, however, we did get the bulldozer back on the right-of-way. I often wondered if that had been left to the Honorable Minister and myself, just where the railway would be today.

Shortly after that ceremony, the actual construction of the railway commenced and the steel arrived in Hay River and Pine Point around the first of November last year. In the construction of a project of this size we have a lot of things in our favor. This cut down the usual timing and allowed us to complete the railway as quickly as possible. This was what the Federal Government wanted us to do at that time. We used all the technical advantages in construction that could be possibly used. We had three things in our favor. We used aerial reconnaissance for locating the railway and aerial photography which saved many, many months of tramping through the bush and shortened that phase of the project by at least one year. Secondly, the fact that the AGT microwave system served northern Alberta to the boundary and the Canadian National system to Hay River, enabled us to use radio communication on the project which also saved a great deal of time and a great number of people. The third main factor was the Mackenzie Highway. And this is one time, as far as I am concerned in my experience with the railway and railway construction, that things were just turned the opposite way. This time

we had a highway to use. Usually the railways have been first and the highways came along after, and I can assure you we made excellent use of the Mackenzie Highway. As a result of these things the railway was completed on the first of November, 1964 insofar as the track laying was concerned and this enabled us to handle traffic on the line at reduced speed. As you know, Pine Point Mines commenced shipping raw ore on the 15th of November of last year.

Since the start of construction, in particular from the time the steel arrived at Manning, four elevators were built there before the rails arrived there (one of the biggest country elevators in Canada had been built), we have taken off the Slave Lake Railway in the way of outbound traffic: 1,415 cars of grain, 906 cars of coarse grains, 33 cars of copper-silver concentrate from Echo Bay Mines on Great Bear Lake, 4,387 cars of lead-zinc from Pine Point, in timber products 95 cars of ties and 1,011 cars of lumber, 92 cars of machinery, and 58 cars of miscellaneous traffic, making a total of 7,997 cars of outbound traffic in less than the first year of operation of the railway. The inbound traffic this year was very sizeable on account of the rail being into Hay River, and shippers took advantage of rail transportation to connect with northern transportation down the Mackenzie River. The inbound traffic was 520 cars of petroleum products, 478 cars of building material, 96 cars of coal, and 650 cars of other miscellaneous traffic.

When the agreement was made in regard to the construction of the Pine Point Railway, it was based solely on a tonnage of 215,000 tons of concentrate a year from Pine Point Mines. That was the commodity and the tonnage necessary to get the construction of the railway under way. Now you will have some idea of what has happened, in addition to the ore that is moved from Pine Point. These are the things that are unpredictable when a new railway has been constructed because it gives the opportunity of widespread pros-

pecting, exploration, and, through timber country, saw mill and planing operations.

Now I would like to get back a few years to when the Hudson Bay Railway was being constructed. It took from 1910 until 1930 to complete the Hudson Bay Railway, a distance of 510 miles. There was five years of interruption on account of the First World War, but if we had to use the methods of that day, the Slave Lake Railway would not be in existence for another three or four years. So I mention this because I want you to know that we are following all the technology and advancement that we can find today in railway construction, which again is playing an important part in the economy of Canada and the development of the North.

As far as the Slave Lake Railway is concerned, I cannot predict whether it is going to grow beyond Hay River, I don't think anyone can at this time. However, with the intensified activity of prospectors and exploration parties, there is no question of doubt that somewhere in the North, a sizeable body of ore will be found that will make it economically possible for the railway to proceed farther north.

In constructing the railway we have built in maintenance which have never been done before in regard to railway construction, in that, in the construction we can build in maintenance much cheaper than if we built a skeleton railway and had to do it later. This is one of the faults with much of our transportation system in the west today. The railways across the Prairies were built with light rails and only built to handle very mediocre tonnage such as grain and lumber. With the Pine Point ore we are faced with handling modern, heavy loads. We are building and will have ready by the middle of next month, 245 special ore cars to take care of the lead and zinc concentrates from Pine Point to Trail and to Vancouver for export. These cars have a capacity of 100 tons and, as a matter of fact, today in industrial development and new projects the 100-ton car for heavy bulk commodities is replacing the lighter equipment. You can understand that a railway

has to be built with a much heavier structure to withstand this weight at reasonable speed. I might say that the Northern Alberta Railways are undertaking a five-year program to up-grade the line from Peace River to Edmonton so that they will also be in a position to handle cars of this weight.

Since the completion of the Hudson Bay Railway there have been several branches built from it into mineral deposits, Flin Flon, Sherritt-Gordon, and now from there to Lynn Lake, the line into Thompson, Manitoba and the line into Chisel Lake. It is reasonable to assume in the Northwest Territories that branches of this nature could occur, being built from the main trunk extension of the Pine Point Railway. I think that the people of this country are beginning to realize the impact that the railway is making because it is certain that, while aviation plays a very important part in development and exploration of the North today, when it comes right down to the actual fact to get development under way, a railway is still needed and, in many areas of the North, railways will be required in the days to come. I think with the technological improvements that railways are making in equipment, motor power, track structure that in spite of the promoting of pipelines, railways will be in business for a long time to come.

You all heard the Premier make some remarks about future railway development in northern Alberta and he stated, too, that an agreement had been signed between Canadian National and the Provincial Government in regard to a resources railway north from a point on our main line fourteen miles west of Solomon to the hot coal fields. In that area, it is factually known that there is a tremendous resource for industrial development and I am quite sure that the Provincial Government is going to pursue this sort of program in the interests of development and employment for the people of the Province of Alberta.

Much planning has been done for the future, and much of it is not at the stage where it can be talked about now, but I am quite sure that Mr. McLaughlin, in cooperation with his colleagues, will be making announcements from time to time in the next few years.



G. C. HAMILTON

Prior to his appointment as City Commissioner in charge of Planning and Development for Edmonton, Alberta, Geoffrey Hamilton was in private practice as an engineering surveyor in Saskatoon and Edmonton. He was a graduate with distinction from the University of Toronto's course in Town and Regional Planning, and is an associate member of the Town Planning Institute of Canada.

SUMMING UP AND FUTURE PROSPECTIVES

presented by

G. C. HAMILTON

I HAVE attended quite a few conferences and have had a hand in organizing more than a few of them, and I want to say in all sincerity that I cannot remember having ever attended a conference that was so superbly organized, the discussions of which were so exactly on the point as the one that we are now concluding.

So far as northern Alberta is concerned, and perhaps particularly the Peace River district, in the past this frontier area was concerned with highly agricultural activities of what must now seem fairly primitive nature and the beginnings of a forestry industry, in more recent years there was a stage of exploration for petroleum products but this is, of course, in very recent times.

Where are we now? The Pine Point Development is moving ahead and with it, passing through this area, the Great Slave Lake Railway. It has a tremendous impact which is already beginning to be felt around here. The imminence of the Peace River Mining & Smelting operation, again, will have a major impact on the whole economy of this part of Alberta. The large oil sands production at Fort McMurray is now under construction with the construction program running, at the moment, at the rate of about one million dollars a day in expenses and this will continue for more than a year. The changing scene agriculturally, agricultural technics are changing and the products of the farm also changing in response to a much more intensive and increased market. Forestry operations, it could be said these are now on a point of maturity and the promise of really huge increases in the forestry activities can be predicted with certainty. So this is a very critical time, I would think, in the development of the North.

The Conference is timely, and it is valuable. It is valuable to outsiders like myself and all others who do not live exactly within this region, because it focuses

attention on what must be the most dynamic area in Canada, if not in North America, and reminds us again that this is occurring here and now. I think it is valuable because it serves to give the Government a renewed reminder of the vast development which can be expected in orderly fashion and in due time so that they can review the policies and, if necessary, revise them to best fit the type of development which is now pretty clearly foreseen for this area. It is valuable because it gives the people in the area a first hand hearing from the most competent authorities of what they may expect and at the same time, what perhaps is not so realistic for them to continue to work for. I think the Conference certainly got off on an appropriately realistic note yesterday when certain hopes regarding new agricultural developments and the imminence perhaps of new pulp mill developments were put in proper perspective. All these things can be anticipated but perhaps not as soon as one might want to think as one gets enthusiastic.

With these few general remarks about the Conference, I will now give you one or two thoughts that occurred to me as I have listened carefully throughout the past two days.

In the discussion of agriculture, there was one thought that certainly came to my mind. The speaker was discussing the production of rape seed, which is a relatively new crop and is a product of some agricultural importance. Two-thirds of the export of this product, three-quarters of Canada's production of which comes from this area, is exported to Japan. Now back in Edmonton we have heard quite a bit about Japanese lately and have been in close contact with them on a number of matters, and it struck me that here again was another reason why we should remember that this business of trade and buying and selling is certainly a two-way street. If this big buyer of this specialized oil seed crop is going to continue to be the major buyer

then I think it is up to us to remember that he can only buy from us if he sells to us. And I do think that is a point in this day and age that we should never forget.

The vital role of transportation was reiterated again and again, not only in Mr. Graham's talk, but obliquely in connection with almost every speaker and here again this is one of the principal facts of life in the North. If only this vastly productive area was closer to the huge markets of the continent, how different things would be. But between here and there is always this great gulf of distance which can be charted in dollars of cost represented by transportation. It seems to me that the story of the new railroad was entirely appropriate and correct. Here is a most modern facility to even the most casual observer bearing almost no resemblance to what was described as the "turkey tracks" that were laid down in earlier years with primitive equipment, primitive communications to operate them, and so on. The railway that operates into the north now is about as different to the turn of the century or 1920 railroads, as those were from the first trains that crossed this continent. And so it should be. I believe that the transportation agencies are doing their part in reducing what is always the major critical cost factor when one is considering northern production.

It seems to me that from the very first of this Conference, there was one point that became ever more evident. If this is indeed a frontier and is in a state of development, then if we were simply to sit back and let the constructive economic forces go to work to develop the area and the resources in it, then we would have yet another repetition of what was described as a chaotic, ad hoc frontier development. Now, I think that this is no longer necessary. It is certainly costly in terms of both public investment and in terms of the efficiency of the best returns so far as the private investor is concerned.

In this day and age with the modern techniques of photoelectric mapping and all the rest, the Government and the official agencies who have authority to control this sort of development and guide it in proper directions, know all they need to know to assure that, as the frontier does develop, it does so with maximum orderliness, efficiency and a minimum of duplication of utilities and public works. If an oil field is being developed in an area in the North, then surely it can be determined quite accurately now, whether that same area holds a potential for forestry, or for agriculture. Almost the exact extent of those other developments can be calculated and foreseen. It seems to me that the pattern of roadways and all the other services that go in to support the first industry, marking the initial development of this new area, should be so laid out and organized as to anticipate their subsequent use in later stages of development. It does seem to me that the Government has this clear responsibility since it certainly has the knowledge of what exists and the ability to guide and control. I think this can be carried one stage further and I am not advocating a great increase in the role of government in interfering with the normal free enterprise commercial risk development, but I think it must be admitted that the Government's history thus far of planning, developing and administering the new

towns has been something less than ideal and I believe that here is an area where the Government should closely examine its past performance and do better the next time.

One other point which did cross my mind was this. There was a question asked this afternoon, "Where will Mr. Heffernan's plant be located?" He gave the logical answer. Now my concern is with Edmonton which is the largest city in Alberta and which has plenty of problems associated with its continued, unstoppable growth. Now, if there was no attempt to the contrary, I suppose nearly every industrialist would make the same decision that it is better for him to locate his manufacturing facilities in the city, provided it does not have to be located right on the site of the mineral or material being extracted. If this were allowed to continue without care by the authorities, the Government agencies, those who can direct these matters, we could see a sort of magnetic attraction that the big cities have for nearly every developing manufacturing activity. Now my job is to attract industry to Edmonton, but I can't help but wonder whether the Government is not properly entitled to see that not all the industry gravitates to the large centers. If the big cities were able to carry on with their own financing without appealing to the senior governments, notably the Provincial Government, for assistance for this or that aspect of major urban affairs, it might be a different story. The plain fact is, that the cities are costly entities for the whole province anyway and so I think the Government is entitled to take a long look at what is best in terms of the development of the whole province. Should the industry be dispersed with positive public assistance to the benefit of the region in which the resources are found or should it not?

One thing that I think is essential here is that the impetus and enthusiasm that has been generated by this Conference should be continued. How? Well, I think the ball has to be picked up by almost every agency that is active in promotion. And I do believe that there is a definite role here for the Boards of Trade and the Chambers of Commerce in this area. They should carefully examine what was said here, should reject the "pie in the sky" as it has been identified here, do not continue to hope and talk unrealistically about those things which will come in time, no doubt, but which are not to be realistically expected within the next five years, concentrate on the things that are practical and possible of achievement, decide what these are, fix your goals, and then promote toward them.

It seems to me that in a special category here is the matter of tourism, and the talk today by Mr. Crampon hit the ball exactly. I couldn't have agreed more with his suggestions about the tourist potential of the North and how to go about promoting it: a regional promotion rather than an individual municipal promotion is the answer. I do believe, as an Edmontonian, that there is a great potential for northern tourism sitting right in Edmonton and I am sure it is the same in Calgary.

I wish you well in all these things, I am most thankful that I was able to attend this Conference.



J. J. DEUTSCH

John Deutsch was born in Saskatchewan, where he received his public and high school education. Following graduation from Queen's University with a B.Com. in Commerce and Economics, he was appointed Research Assistant in the Department of Economic Research of the Bank of Canada, during which time he was on loan to the Rowell-Sirois Commission as Assistant Director of Research.

From 1942, when he was appointed special wartime assistant to the Under-Secretary of State for External Affairs, Mr. Deutsch served as economic adviser to the Winnipeg Free Press, Secretary to the Royal Commission on Administrative Classifications in the Public Service, Director of the International Economics Relations Division of the Department of Finance, and Assistant Deputy Minister of Finance. In 1956, he left the government service to become Professor and Head of the Department of Economics and Political Science at the University of British Columbia, then in 1959 became Vice-Principal (Administration) and Professor of Economics at Queen's University, Kingston. He became Vice-Principal of Queen's University in 1962.

Mr. Deutsch has served on a number of Royal Commissions, and was appointed Chairman of the Economic Council of Canada in 1963.

SUMMING UP AND FUTURE PROSPECTIVES

presented by

DR. J. J. DEUTSCH

Chairman, Economic Council of Canada

THIS is a land of tomorrow, one of the speakers made this point at the very outset of this Conference. This touched a spark that goes back to my younger days. I was born on a Saskatchewan farm, my father was a homesteader, one of the pioneers of that province, and of course, this was also a land of tomorrow until the onset of the 1930s. To come back here and find this atmosphere once more is a very exciting thing. Another thing that is very exciting, of course, is the fact that this is truly a frontier. Now, I have seen frontiers in many parts of Canada and elsewhere, but the frontier here is something quite unique and, again, one wonders why this is so. I think the answer came to me while listening to the speakers in the Conference. The fact is that this is many frontiers. Frontiers usually are associated with one thing. It is an agricultural frontier, or it is a forest frontier, or it is a mining frontier and these you find in many parts of Canada, but nowhere do you find all these frontiers put together in the same place. This is quite unique in the history of Canada and probably unique in the history of this continent. You have a whole series of frontiers here in this great northern part of Alberta and all of them are in the process of development at the same time.

Another thing that is very impressive, especially when you come to it for the first time, is the extent of the present development as related to the future. In every case, you have only moved a very small part of the distance to which you are ultimately going. The potential in every one of these fields is extremely great in the future and you are partly begun on the road. This is on a scale which is quite staggering in most cases.

Now, with this kind of potential and this multitude of riches, all of them with the main possibility still lying far ahead, one wonders why so little of the distance has been travelled up to now, and what has been the problem here. Why are we at this early stage

of growth and development? I have been puzzled about this and have been trying to assess these reasons as I was listening to the various speakers and discussions, and I will tell you what occurred to me. Some of these things have been mentioned specifically but I want to go over them with you very briefly at least to let you have the result of my speculation on them, and then I want to perhaps consider the future in relation to these problems.

The first very basic problem here is the one of transportation. The reason is, of course, that you are at the greatest distances from centers of population and world markets of probably any other point in Canada except perhaps the far north. This means that the cost of transportation has been high and it has been extremely difficult to make a success of the exploitation of resources in the face of these high costs of transportation which are involved. This, of course, is a continuing problem and it is a factor which will determine the rate of progress in this area.

But I wonder if I could point out one or two things about the future. You all know this, I'm not going to dwell on the past, this is a thing that has been studied many times. But I think you have reached the stage now where you are in a position to reduce this handicap quite considerably provided you take advantage of the possibilities that now exist. You are now in the position here, it seems to me, of making rational use of the alternative forms of transport which are now available. You have the possibilities of the railways, airways and roads and you are in the position of being able to develop these transportation possibilities in an efficient manner whereby you use each of these forms to its best advantage and not duplicate or engage in costly and foolish competition between these different forms and in a great deal of unnecessary investments which, of course, characterizes a good part of our trans-

portation system in other parts of the country. Your railways can now be developed in a way in which the railway can do its best job. You are not handicapped with all kinds of old commitments and old situations which cause you to really make an inefficient use of this method and I hope that, as you develop the railways here, you will use them in a way in which they can do the cheapest and best possible job and don't expect them to do things that other forms of transportation can do better.

The same is true of air; air has played an enormous part here and will, of course, continue to do so. Use it for the purposes for which it can serve you best. This includes passengers and certain kinds of freight and communications. In these ways you can use this type of transportation very effectively and not get in conflict with other forms and engage huge investments therein which, indeed, will turn out to be extremely costly. Then you have the roads. Again, this can be made complementary to the railway and air systems. Now, with intelligent use of a combination of these things, you can, to a considerable degree, lessen the handicaps which you have suffered in the past in the development of this area. You have an opportunity to do this and I hope you will take advantage of it.

Another thing that has been a problem in development in this same area is the problem of markets. This was discussed, of course, in many papers, but your resources here are on a very large scale. When you talk about oil, you talk about some of the greatest deposits in the world. You have 75% of the unsettled, arable land in the whole of the country, in this area. You have much of the great forest resources of this country. These are gigantic resources. You are going to develop them, and because of your high cost transportation problems, you can only develop them on a large scale; otherwise you cannot meet the overhead costs of transportation.

Now, as you develop them on a large scale, you have to have markets and the markets have to be, in a considerable measure, in foreign countries. So you have to be very careful about policy that affects your foreign market. Policies which will reduce your foreign market because other countries can't buy from us or don't want to buy from us because we don't buy from them and things of that sort or because our commercial policy is not favourable. No matter what you do, your efforts will be frustrated because unless you have markets, no matter what your effort is, how diligent you are, how much investment you make, or how careful you are, you will end up in frustration. So this is a very vital factor in the future development of this area; the maintenance of your foreign markets on an expanding basis. I do not need to tell you about the importance of this for oil or for the development of your forest resources or your agriculture. This is a vital requirement, that you have expanding foreign markets.

Now, another factor that is of very great importance is the whole question of technology. One cannot listen to the discussion of the different development in the resources in this province, in this northern part of Alberta, and not be struck by the fact that, while your resources are extremely rich and extremely large, the exploitation of them involves technical difficulties.

Many times these technical difficulties are quite peculiar and answers have to be found before the resource can become an economic fact. When you talk about the tar sands, which rightly are a phenomenon as far as world resources are concerned, there were very extensive technical difficulties making this into an economic resource. You all heard Mr. Heffernan this afternoon telling about the iron ore deposits. Here you have to engage yourselves in the task of developing a process. Now, you think that steelmaking is a very old business and has been carried on in a gigantic scale all over the place and yet here, before you could make use of this good resource, you have to set out to find a process.

So it could go on and in many other things. In the case of agriculture, again, if you are going to make the best of the agricultural resources in this region you have to do something that is particularly suited to these conditions. They are not the same conditions as in southern Alberta or southern Saskatchewan and how to make the best of this soil and this climate and this sunshine requires research, experiments and a technical investigation. I suspect that your agriculture will benefit very greatly from improved technology. You are on the beginning of it now, you are specializing already in seeds and things of this kind. Even here, you have a long way to go. You must, if you are going to get the benefits of this tremendous body of nature, continue to put a greater emphasis on the improvement of technology.

I have been very much impressed by the role which some of your institutions have played in the development of your resources, such as the Alberta Research Council and the University of Alberta and so on. This activity will continue to be very, very important and you are just at the beginning. Even though you have made some very interesting progress and some of these resources are now coming into the stage of large-scale development, you are still just starting and have a long way to go yet.

Another reason I emphasize this is that you will want to, in time, do an increasing amount of processing of some of these things in this region and this province. In the early stages, of course, you will be sending out mostly raw materials and this is not unnatural, especially in a pioneer development. But in time you shall want to do more processing and to develop more sophisticated products and in this connection the development of technology will be very, very important if you are going to achieve this result.

Then there is the question of people. I want to say a word about that. The thing that I was very much impressed by was the fact that as I looked at the statistics and at the map, the relationship between people and resources was absolutely staggering. Here you have an area of very rich resources wonderfully well balanced in every way and in this whole area you have less, I believe, than 100,000 people. This is about 1/14 to 1/15 the population of this province. The other 13/14 or whatever it is, lives in one half and 1/14 lives in the other half, and indeed the scale of resources in this second half, in this northern half, is quite clearly much more impressive than the other part. And yet, you have

this tremendous unbalance in population. The amount of resources per capita in this area is enormous and the problem is, how do we achieve an opportunity for a great deal more people than are here now in this vast area? As you solve your problems and take advantage of your opportunities, the population will, of course, grow here.

There is an aspect of this which must be emphasized now. This came out time and time again in the papers. The kind of development which is now taking place and will take place in the future will allow increasing levels of skill. What you are going to gain here in northern Alberta is not going to involve many wheelbarrows and many spades. This was the case in an earlier generation of pioneers but is not going to be the case in the future. You are going to require a high level of skill in your population to do the sort of things that you are now wanting to do. When you talk about the development of the iron ore, which is a very sophisticated chemical operation, Mr. Heffernan has pointed out that he would want practically his whole staff made up of engineers and technicians. He had nothing to do for the others. He was going to run his plant mostly with automated technics. This, again, is increasingly evident with the development in oil and so forth. Everywhere you look, you find the same basic underlying trend. This means, of course, that you must attach a tremendous importance to the development of the skills of your population. With the problems which you have in this area with its costs and remoteness, you must supply the latest technics and most efficient methods and this can only be done if you have a properly skilled, educated population. So this is a vital factor in the future development of this area.

First of all, make sure that your children obtain the maximum possible degree of education and training. If they do, they can participate in the enormous development which will be coming here. Otherwise, that development will depend upon the bringing in of skills and technics from outside, therefore, your educational institutions are vitally important. I know there has been great progress made in the province of Alberta in recent years in this regard.

Finally, I want to say a word about the relationship of this area to the rest of Canada. Our country, in the next five to ten years has to grow very rapidly. The reason is that we have more young people coming forward looking for jobs in relation to our population than any other western nation. Our labor force will grow more rapidly in the next five to ten years than any other time in our history. In order to provide opportunities for these people, our country will have to develop and grow fast and for that reason the contribution that can be made here is extremely important. You, yourselves, I expect, will enjoy a very rapid period of development and growth if environment is at all reasonably favorable. But your growth here is bound to have a very stimulating effect upon the rest of Canada and this will make a very important contribution to the achievement of our goals in the years ahead.

Why are you going to have such an important impact on the rest of the country? Because, again, the kind of development going on here will depend upon the use of the latest machines, the latest equipment, and the most efficient and modern things and this means that you will be buying things in large quantities from the rest of the country, in the process of development. This is bound to have a stimulating effect on the country as a whole. Also, you will be pouring a great deal of purchasing power into the economy as you expand and this will be a very vital factor in the total growth of the country.

There is another thing that is very striking when one comes here and that is that you provide a north-south dimension to our land. You know, our country is, geographically, a very difficult land; we are spread as a very thin ribbon across a great distance close to the American border; we have only one dimension. It has been said that Canada is like a string of beads, stretched out, and not all the beads are pearls. This has been the geographical feature of this land and here in Alberta, particularly, we are achieving a north-south dimension. We are getting a very substantial breadth to our land. As I looked at your map I was surprised to see that the 55th parallel that we talked about is about 120 miles north of Edmonton, and this is where the north begins, and this is, of course, where all this great development begins. Few people in Canada realize this and Edmonton is regarded, in most places, as something way up north. Here, of course, it is in the south. Half of this province's area is north of the 55th parallel. This has an enormous significance and it will add, as I say, another dimension to our geography. This is very important.

The dynamic development in this area together with the area in British Columbia will be an immense factor in strengthening the economic structure of this country. It means that we not only have enormous and dynamic development along the St. Lawrence valley, which of course has been the historic center of Canada, but we are now achieving substantial development in other important parts of our country. This will contribute to the strength, both political and economic, and structure of this land and, therefore, what developments take place here in the years ahead will play a role which is far greater than the immediate impact in this western part of the country.

At the end of your conference it was suggested that we should now go away, ponder upon these things, and perhaps come back five years from now and see what has been accomplished. That is a splendid idea. You have laid an excellent foundation at this conference for the tasks in the five years ahead. You have provided a great deal of pertinent information, you had an important stock-taking, you have indicated some of the essential problems which must now be tackled, and you must now proceed to do this. I wish you every success for yourselves and for the benefit of the country as a whole.

